



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

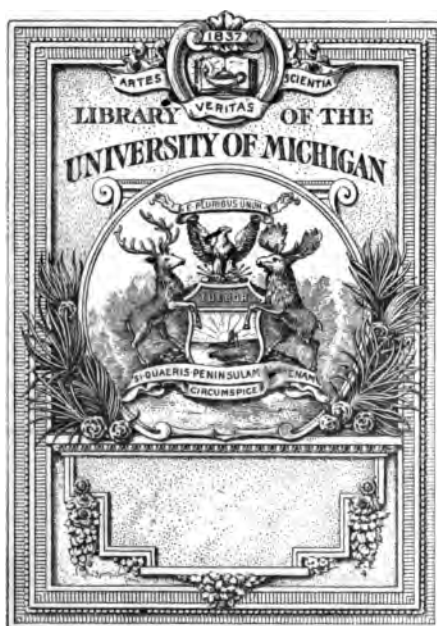
- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

A 440906

Educational Psychology Monographs



LB

157

W 2.

1963

**SPELLING EFFICIENCY
IN RELATION TO AGE, GRADE AND
SEX, AND THE QUESTION
OF TRANSFER**

Educational Psychology Monographs

Spelling Efficiency in Relation to Age, Grade and Sex, and the Question of Transfer

An Experimental and Critical Study of the Function of
Method in the Teaching of Spelling

John Edward
BY

J. E. WALLACE WALLIN, Ph. D.

Director of the Laboratory of Clinical Psychology in The
New Jersey State Village for Epileptics

* Author of "Researches on the Rhythm of Speech,"
"Optical Illusions of Reversible
Perspective," etc.



BALTIMORE
WARWICK & YORK, Inc.

1911

Copyright 1911
BY
WANWICK & YORK, Inc.

TABLE OF CONTENTS.

Preface	vii
CHAPTER I.	
Introduction	1
CHAPTER II.	
Spelling Proficiency as Measured by School and Grade Totals	26
CHAPTER III.	
The Relation of Spelling Efficiency to Sex and Age	49
CHAPTER IV.	
Does Spelling Efficiency Acquired in Column Drills Transfer to Dictated Compositions? .	65
CHAPTER V.	
The Spelling Drill in Vogue in Cleveland as Viewed by Principals and Teachers in the Elementary Schools	77
CHAPTER VI.	
Summary of Conclusions	82
Bibliography	85
Index	87

✓

•

PREFACE.

During the last decade the interest taken in the "simplified spelling" movement and in the improvement of teaching spelling has been widespread. This is not surprising, in view of the fact that spelling is a fundamental social tool. No person can be considered socially efficient, in all that these words imply, unless he is able skillfully to manipulate this tool. There are few elementary school subjects in which inefficiency is more swiftly detected and more severely reprobated in later life than in spelling. There are few elementary branches in the teaching of which the schools have been charged with more uneconomical use of time. In 10 of our largest cities, 7.22 per cent. of the pupil's time in the elementary schools is devoted to the study of spelling, and yet the complaint continues to be made that the elementary schools, and even the secondary schools, are flooding the country with an army of inefficient orthographers. It has, therefore, become the custom of condemning the schools because they break down in their fundamental mission—the developing of skill in the basal instruments of social control.

School superintendents and teachers have felt the justice and the sting of these hostile criticisms, and have attempted to provide a remedy by increasing the time devoted to the study of spelling or by changing the methods of teaching. The results have not always been satisfactory. Faddists have arisen and

proclaimed the discovery or invention of a new method which would revolutionize the teaching of spelling. The chief claim for most of these methods has been that they would provide a "royal road to orthography," easy of travel for the footsore, the weary or the indolent. One of these royal roads, the one most frequently pointed out, leads via the incidental method.

The writer has never believed that with an orthography so irrational and complicated as is the case with English spelling orthographic excellence was to be found along some *royal road*. He has been of the conviction that efficiency in the use of a mechanical subject-matter such as spelling was to be found in the employment of a drill technique fashioned in accordance with the laws of habit formation. Two years ago he was afforded the opportunity of observing the use of a spelling drill in the public schools of Cleveland, which fulfilled some of the psychological requirements of a good drill technique. Since the same method was used in all the schools of the city, the entire system constituted, in effect, an *experimental school* in spelling, and afforded favorable conditions under which to conduct an experimental investigation in spelling. The following pages contain the results of one such investigation. It was the intention to follow this study with a different series of tests, but circumstances now make this impossible.

J. E. WALLACE WALLIN.

The New Jersey State Village for Epileptics
at Skillman, April, 1911.

CHAPTER I. INTRODUCTION.

Two stock methods of teaching spelling are in current use, the incidental and the drill methods. When the former is followed no provision is made in the daily program for a set spelling period, either for study or reciting, nor is there a definite assignment in spelling for home work. The study of spelling is made an *incident* to the study of the other branches of the daily program—language, grammar, geography, history, theme writing, etc. This method is of a piece with the method of *correlation* of the Herbartian school, and is theoretically defended on the same grounds. It is often referred to as the *natural* method, because the child is taught to spell in connected discourse, particularly in connected written composition; in other words, in the habitual situations of life. These situations are more complex than writing arbitrarily chosen word lists, and they are the only situations in which writing ultimately has any value. In the out-of-school situations we are scarcely ever obliged to spell except when we write series of words, or sentences (essays, letters, reports, addresses, copy). The claim is set up, therefore, that to produce satisfactory results spelling should be studied in school situations which contain *identical* elements with life situations, and not

in artificial situations, which are less complex and less realistic. To study spelling in this way, incidentally, is to render the process *dynamic* and *practical*. We commonly master a subject when we find practical use for it. The child will learn the fundamental mathematical processes with avidity when he realizes that they supply the means for summing up his scores in his games, or for pursuing successfully the constructive activities in the manual training shop, or for conducting the financial operations in the make-believe school bank. Memorizing a poem in order to dramatize it renders the learning practical. To test knowledge by use or application supplies then a vital motive for its acquisition: knowledge getting only becomes dynamic when impelled by the need of solving a problematical situation which is practical and which can only be solved by the acquisition of a new knowledge content. Now, the incidental spelling method, just because it stresses the *application* phase of knowledge, is superior, it is contended, to the spelling drill which, since it is divorced from a practical, dynamic situation, is formal and lifeless. It is immaterial to the "incidentalists" whether or not the child spells words correctly in lists or columns, since he has no use for column or list spelling in the world's work, just so he spells them correctly in sentences, phrases and paragraphs.

The first objection urged against the drill, therefore, by the incidentalists is that it is artificial, divorced from life and formal, while the incidental method is dynamic and natural, since it contains elements that are identical with complex practical life situations.

Because the spelling drill is formal it is contended that it degenerates into a mechanical grind which either becomes a refuge for the naturally slothful pupils—it is the line of least resistance for the pupils who are too indolent to think—or becomes a monotonous grind against the intolerable monotony of which the better pupils rebel, and which engenders in these an aversion toward school life. The lazy boy likes the drill, because it is an easy and superficial process, like all mechanical activities—walking, babbling, breathing, etc. Its basis is instinctive—the instinctive tendency to imitate. The nervous system is so constituted at birth that it tends to repeat certain experiences. The child is born with the tendency to *la-la* in imitation of others or his own spontaneous or accidental utterances. The lazy child thus naturally takes to iteration and reiteration, in preference to thinking, which runs counter to instinct and requires effort. It is easier to “learn” what rules, demonstrations, adjectives and interjections are by simply repeating and memorizing statements and lists of words than by striving to comprehend them.

On the other hand, for the intelligent pupil the drill is a paralyzing grind. Based on sheer repetition, it tends to hypnotize and stupefy the mind. It benumbs the higher intellectual powers. It stresses the memory at the expense of judgment and comprehension, and at best produces only, as in China, a race of memory prodigies. It puts a premium upon receptivity, docility, imitation, re-learning, iteration, and discounts creativeness, inventiveness, independence, spontaneity and originality. It makes for mediocrity, not genius; and produces hide-bound traditionalists—our educational stokers and hewers

of wood. Its natural result is the pernicious system of cramming now rife in the colleges and lower schools. The drill has thus become the be-all and end-all of the educative process. The mechanical, memory grind has spread insidiously to all the branches, and has become unconsciously the fixed ideal of mental acquisition. Memorizing and learning have thus become synonymous.

This reverses the natural order of learning. Out of the school we strive to comprehend first, and then memorize. We first try to understand the directions given to us, and then fix them in the memory. But in school we encourage the child to memorize first and understand afterward. We argue that the raw materials in the form of memories will supply a leaven which will ferment at the proper time into the finished products of judgment and understanding. But frequently the pupils have so much to "learn" that they never have time to think or understand.

Another objection to the drill method of acquisition is that it is uneconomical. In the drill no pretense is made of supplying the mind with nourishment. The child is obliged to spend his time cramming over old materials when he should be acquiring new facts. To keep on repeating old combinations deadens the mind instead of nourishes it. Instead of mental growth mental stagnation follows. At the same time, the incidental method is a valuable measure for relieving our congested modern curriculum. A specific period for studying and reciting some other branch becomes available, without any impairment of spelling efficiency. So far as there is any need for fixing the spelling

of words, this can be secured by constant attention to spelling in the other branches of the curriculum.

Finally, it is contended that tests of spelling efficiency show that children spell as well in schools where the spelling drill has been abolished as in schools where it is in vogue—of this more later.

It may be frankly conceded that there is force in many of these objections. There is not enough genuine, thought-provoking, vital work in many schools, and too much tolerance of glib, meaningless symbols. There is too often a tendency to permit children to deal with empty husks and shadows instead of realities, and to be satisfied with the pretense and illusion of knowledge. There is too little emphasis on understanding, creativeness and originality, too little attempt to motivate learning by relating it to a relevant situation representing a present need in the child's experience; too much unvarying repetition of identical forms instead of application of old data to new instances and situations. But while granting this, it may also be affirmed that many objections to the drill are due to abuses or misconceptions of the drill. The defense of the drill, however, cannot be attempted here (13¹), except as it relates to teaching spelling.

The drill method, as distinguished from the incidental, requires special periods for the study and reciting of spelling. It rests its contention primarily upon the fact that spelling is merely a tool. It has no value in itself, i. e., it has no intrinsic content value, as has a knowledge of foods, diseases, poisons, skins, woods, metals, etc. If there were

¹ These numbers refer to the references cited in the bibliography at the end of the book.

no writing or reading it would be superfluous—a wholly valueless content, having neither practical, cultural, ornamental nor social value. But it does have an *instrumental* value. As an instrument it is an indispensable social necessity—a social instrument of control for thought conveyance. It enables us to communicate our thoughts in writing or printing. Without it we could not read. Its value, therefore, is instrumental, just as numbers (figuring, computation) are valuable as tools which enable us to control the numerical and quantitative aspects of our environment, but have no intrinsic content value. All subjects contain these instrumental units of facts which enable us to perform certain activities, or to acquire further knowledge, power or skill. While they are of great value as *means* for *controlling* values, they may possess no independent *values*. To illustrate: the hatchet, saw, plane and chisel serve as tools by means of which we can extend our control over physical values in our environment. By controlling these we build houses for protection, bridges and conveyances for transportation, chairs and couches for supports, etc. If we could accomplish nothing with them they would be useless. Spelling, then, is a tool whereby we extend our control over certain social values.

Now, the value of a tool as a tool is directly proportioned to our ability to use it *skillfully*. The craftsman's success depends upon his ability to hold and manipulate his chisel, hammer and saw with facility, accuracy, dispatch and without effort; the piano player's success depends upon the skillful adjustment of certain pressures and rates of movement of fingers and arms, or in a word, upon

technique; the writer's success, on the instrumental side, depends on his ability to spell, punctuate, space, indent, etc., correctly, rapidly and readily. Furthermore, the facile, accurate and economical (that is, the skillful) use of tools means *automatic* control of the elements of form and execution—of posture and manipulation. Unless the pianist can automatically manipulate his finger, arm, wrist, foot and eye movements, he will not be able to attend to those finer nuances, shadings and interpretations which constitute the soul of artistic rendition. As long as the sculptor must divide his attention between his model or his ideal, and his chisel and mallet, he will bungle. He must be able to hold his chisel just right and gage the blows just right, without the necessity of concentrating his attention upon these mechanical elements. In artistic creation or skilled artisanship the instruments of execution should take care of themselves.

Similarly we have certain unvarying mechanical subject-matter of the intellectual sort which should be reduced to an unconscious automatic basis—certain fundamental A, B, C's of knowledge, certain basal tool facts and ideas, such as spelling, pronunciation, word meanings, the fundamental mathematical processes and basic tables, certain fundamental historical dates, rules and principles, certain literary gems or adages, and certain muscle coordinations closely related to intellectual functions. These ideas or facts, because they are almost universally indispensable tools in modern life, should be so firmly knit together that when one term of the association occurs the other will function automatically at once. The moment the word

is heard or thought the associated visual symbols should come to consciousness unhesitatingly. The essayist cannot write a clear, forcible, logical paper if his attention must be diverted frequently by the efforts to hold and move the pen properly, or to spell and punctuate correctly. To be able to attend fully to the *content*, the elements of *form* must be organized into *habits*, so that they will function with mechanical precision and without conscious supervision.

The contention of the advocate of the drill, then, is that spelling is one of the most obvious examples of subject-matter that is *instrumental* in value, and invariable and *mechanical* in nature, and of which every socially efficient person must have an *automatic* command. On the question of how this skillful control is to be secured, he considers that the "incidentalists" is fundamentally in error. The incidentalists maintain that attention should be focused upon the *content* of knowledge (the facts and relations in geography, history, language, etc.), for the *form* (spelling) will take care of itself: the visual form of the written words will be incidentally and simultaneously absorbed as the contents are conned. Attention to the form should only be exceptional or incidental.

This position, the upholder of the drill insists, rests upon a misconception of the process of habit formation. The same factors which condition the formation of habits must condition the drill process, for the central element and aim in both are the same, viz., *practice* or *repetition*, and the production of a state of relative *automatism*. The law according to which habits are formed embraces

three fundamental factors: *initial focalization of attention*, *attentive repetition* and a final state of *automatic behavior*. To teach a child to write I must first of all get his attention focused upon the writing processes. A voluntary action can be performed only in a state of consciousness. But that which does not get into attention does not get into consciousness — except possibly the unconscious cerebral modifications which accompany the gradual maturing of the nervous organism, which affect the total organization of the mind, and certain sub-conscious influences the existence of which is still hypothetical.

The first thing that the teacher should do then is to get the child to concentrate on the processes to be automatized. This she does by verbal directions, by displaying the form or letter which is to be imitated, by reproducing the form before the child's eyes, so that he obtains a visual-form image and a visual-motor image, by inducing the child to imitate the observed movements, so that he gets a tactual-motor series of images of his own movements, etc. By such means as these we get the child to attend well at the very outset to the task set before him. In too many drills this fundamental element, the initial focalization of attention, is entirely neglected. The child gets no *clear idea* of what he must do; he has no definite ideal or aim to *guide* and *vitalize* his efforts. Sometimes the aims presented are so numerous that initial focalization is out of the question: the instructions cover too many points; attention at the outset is bewildered instead of focalized. Attention can be focalized on a new process only when the directions are *clear*, *definite* and *specific*.

After the initial focalization there must be *attentive* repetition. After the child has a definite image of his form and the writing movements, he must keep on repeating it. But merely mechanical or rote repetition will prove largely futile. If his attention is upon the passing throngs outside of the window his repetitions will avail him little. Inattentive repetitions tend to deteriorate; they produce copies which grow increasingly inferior to the model. The writing at the bottom of the copy-book is usually poorer than at the top. The attention to the model has grown poorer. In the average drill the child repeats in a state of relative *inattention*; a part of his attention is on something else—the teacher, his neighbors, his headache, hunger, plays during recess, etc. Of course the results are disappointing, and the drill is condemned. The trouble is that the second fundamental condition of the drill has not been supplied. The vital practical solution of the difficulty consists, then, not in the elimination of the drill, but in devising means of keeping the child's attention riveted on his reiterated tasks.

Finally, in the genuine drill, the attentive repetitions must be continued until a stage of automatic control has been reached or at least closely approximated. If the child grows weary and gives up before this stage is reached, his efforts will count for little. Unless the neurone modifications have been thoroughly solidified, the results will not persist, and the practice effects will quickly vanish. Our hereditary habits, or instincts, which have been organized by innumerable repetitions during the ages do not thus vanish; they rest upon a stable neural substrate. What has been found essential in the organization of racial habits can probably not be

dispensed with in the formation of individual habits. Neural pathways result only from repeated (or violent) neural currents. Even at its best, individual repetition will not produce the stability that has been produced by racial repetition. But the great artists know of no substitutes. It is safe to say that the average drill stops short of the final stage, the stage of mechanization. The child has been assigned so many words to learn in a spelling lesson that effective concentration has been impossible; and his desire for constant change and variety has been so fully gratified that there has not been even a semblance of attentive repetition. Under such conditions the results could not have been otherwise than disappointing, for no drill technique has been followed.

What, now, briefly, is the application of the psychology of habit-formation to the question of the incidental method? If the child absorbs the *content* when he is reading it is because he attends to it; if he gets the *form* it is because it has been attended to; if he gets *both* the content and the form in the same reading it is because attention has seen-sawed between the two. Assimilation in both cases is the result of focalization. But a rapid alternation or splitting up of attention, such as is required in the incidental method, is uneconomical; something will be lost on the side of content and something on the side of the form—the less familiar the form and content are the greater the loss. If the content is unfamiliar the loss will bear most heavily on the *form*; if the form is unfamiliar the content is liable to suffer most. Ordinarily the form will suffer most, because usually when we read we are pri-

marily interested in a certain content and care nothing about the form. Moreover, the ideal mastery of form and content differs radically in aim. The perfect mastery of the content is realized when a state of completely conscious appreciation or comprehension is attained, while the perfect mastery of the form culminates in a state of *unconscious* mechanical control. But, as has been shown, this state of automatic behaviour presupposes earlier states of focalized initial attention and a series of attentive repetitions. On theoretical grounds, if on no others (the experimental evidence will be presented later), the form, because its control makes such claims upon consciousness, should be mastered in a separate exercise.

The disciple of the drill, however, does not by any means take the ground that the incidental teaching of spelling should be wholly abolished. He believes that the acquisition of knowledge should be tested not only by its verbal reproduction, but by its application or *use* in all the practical situations afforded in the school community, so that inevitably the drill method involves the incidental in the stage of application. But he does maintain that the *stock* method for the initial acquisition of the spelling forms must be the drill method, and that the incidental method must be used only incidentally.

Aside from this objection, when the use of the incidental method consists only, as is often the case, in the *correction* of *misspellings* in the regular written work of the school, the advocate of the drill again points to a conflict of the method with the

economics of habit formation. In forming habits one should be careful to make the *first* coordinations correctly. One must avoid suggesting wrong patterns. Only the correct models should be exhibited. The child should not be allowed to make initial mistakes, for then there will be no errors to correct. It is harder to form correct reactions after wrong ones have been formed or started. By avoiding the formation of wrong habits, the energy saved in rooting out mistakes can be used for building up the right coordinations. In the drill method one does not wait to teach the spelling of words until the child has learned to spell them incorrectly. But this is exactly what the incidental method, as often employed, does. The child's attention is focalized upon the incorrect orthography, and this tends to suggest the wrong form rather than the right—by the known principle of contrary suggestion. It is better that the child should never know the incorrect form, so that there will be no chance for wrong suggestions to arise. Better than to permit a wrong habit to form and then attempt to break it, is to so arrange the conditions that the formation of the right habits will be easier than the formation of the wrong ones. Instruction should be essentially a process of *teaching*, instead of *unteaching*.

It is in the last objection, which was mentioned above, that the incidentalist offers his chief indictment of the spelling drill and strikes at its very vitals. Even if we concede, he insists, that the drill may develop spelling efficiency, this efficiency is so highly specialized that the proficiency which has been developed in the formal spelling exercises attaches only to the spelling of columns or lists of

words and is not realized in the writing of compositions or themes. The fact that the child spells well in the spelling lesson is no guarantee that he will spell well in his letters or essays. Spelling efficiency does not generalize; spelling word lists and spelling in connected discourse are two different things. Now the range of spelling efficiency developed by the drill method is so narrow—columns or lists of words—that it is not very useful for practical purposes. Hence we find the “spelling grind” denounced as futile (Rice: 10¹), because there is no discoverable relation between the spelling drill and the result (Cornman: 6). The spelling result is “a constant quantity altogether independent of the method of teaching,” a “function of the general pedagogical health of the class,” (Cornman), most largely dependent upon the personality of the teacher and the maturity of the pupil (Rice, Cornman), his “degree of mental development as measured by the school grade.” The minimum degree of efficiency that may be demanded in the written exercises of the primary pupils is from 94-97%, and in the grammar grades from 97-99.5%, and this can be obtained without the drill; hence we are not justified in attempting by a drill technique to raise the average: sensori-motor habits cannot be further organized or strengthened after they have attained so high a degree of efficiency (Cornman). It matters not that the average

¹ Rice equivocates somewhat. He heads his article “The Futility of the Spelling Grind,” and ostensibly sets out to demonstrate its futility. But he shows by his own investigation that the children who had been drilled made the best spellers, and he advocates out and out the setting aside of not more than fifteen minutes daily for the special study of spelling.

spelling efficiency in many schools as determined by tests ranges from only 50% up. For 33,000 pupils tested the results varied from 53.5 to 84.2% in the case of one test and one group of children, and from 64.2 to 84.4% in the case of another. In one group of fifteen schools the building averages ranged from 73.3 to 77.9%; for a group of twelve cities the range was 70.6 to 74.8% (Rice). For thirteen schools in Philadelphia the building average was 70% (Cornman). Both of these writers seem agreed—that is the general tenor of the articles—that the following factors have no material influence, or at most a very slight influence, upon spelling efficiency: heredity, occupation of parents (referring specifically to unskilled workers), the extension of time beyond a certain minimum, frequency of reviews, writing sentences, doing much reading, the phonic method (the foregoing are mentioned especially by Rice), extensive oral drills; exclusively written exercises, syllabification, or the photographic or flash exposure of the words. The method or device is thus merely an incident in learning to spell.

These conclusions fly directly in the face of the results of tests by other investigators. Meumann concludes from several investigations that spelling methods do vary in effectiveness. He found that the best method was to “combine the sight of the new word with the analytical copying of it, plus at least a whispered pronunciation of its constituent elements.” Abbott (1) found in an investigation on four trained subjects that when the words were spelled out to them they invariably substituted visual imagery, that the letters heard were

never recalled in the form of auditory imagery, that the vocalization of *letters* hindered, but the vocalization of *syllables* aided learning to spell when words were presented visually, and that whatever aids visual presentation aids the learning. The latter conclusion is borne out by Kratz's results (9). He tested the ability of 743 pupils to spell words, using a modification of Ebbinghaus' tests, after they had been clearly and slowly pronounced, displayed to the eye in large type, and looked at and named in concert. The per cents. were 44.8% for the auditory series, 66.2% for the visual, and 73.7% for the auditory-visual—a demonstrated difference as dependent upon method of 28.9%. It was further ascertained, by a test of the ability to observe, that the best spellers averaged more objects observed than the poor ones (these tests were not conducted with high regard for nicety of precision). The writer concludes that in learning to spell the main appeal must be to the eyes. Bean refers to the poor spelling by the pupils of the School of Education of the University of Chicago, and attributes it to the fact that spelling is (or was) "taught there only by criticism of written work and never by drill." He refers to a mentally retarded boy, sixteen years old, doing sixth year work and very poor in spelling, who "learned spelling with surprising ease" when taught "in the usual way." He prepared four lessons a day from an eighth grade spelling book, and frequently did not miss a word during five successive days (3).

The effectiveness of added time and special drill in spelling has been demonstrated in various school systems where the conditions have allowed of a

degree of control that has insured uniformity of method. In the high school affiliated with the School of Education of Missouri State University the pupils who averaged one misspelled word per page in their written work in the branches pursued were obliged to attend a special class until they reached a given standard in their composition work (Charters (5)). Here they studied: (1) certain spelling rules, (2) certain rules for memorizing, and (3) certain methods for detecting and correcting mistakes in spelling. The result was that only two of the seventy pupils of last year now remain in the class. There has been a marked improvement in spelling. It has made focal the necessity of a good standard in spelling, cured negligence and aided the incorrigibly poor speller.

In Milwaukee a drill method has been in use—two new words are learned each day and repeated during successive weeks—with the result that the spelling has nearly attained perfection (11).

Perhaps nowhere has a consistent drill method been in such uniform use as in Cleveland during the last few years; in fact, the whole school system may be regarded in the light of an experimental school in respect to spelling.

The drill technique observed has conformed to the law of habit formation, as described above (see also 8 and 13). First, the *initial* daily *focalization* of attention is secured by limiting the number of new words assigned to two per day (called dominant words). Instead of dispersing the child's attention over twenty or more words, it is intensively focalized upon *two* words. The initial focalization is secured in other ways than merely limiting the number of words. The words are printed conspicuously in

large type at the head of each day's lesson, and thus attract attention through the operation of the laws of primary passive attention. The child is also required to construct sentences of his own in which the words are used. This not only redirects attention to the words, but develops skill in the use of the words in composition. It supplies a means of practically applying the words. When the meaning of a word is obscure, the pupil must look it up in the dictionary; and this also converges attention upon the word. Ten new words thus receive concentrated attack in one week. The conditions of initial focalization have been realized.

Second, attentive repetition is secured, partly by what has already been said, and partly by a scheme of systematic drills and reviews. The ten words focalized during the week recur as *subordinate* words during the next two weeks. They are also made the subject of special review once a week. At the end of every eighth week oral and written interschool contests between the same grades in all the schools of the system are conducted, based upon the eighty words focalized and reviewed during this period. Similar annual contests are also held, and the following year the words are again reviewed as *subordinates*. Each focalized word is reviewed, therefore, four times (or five, including the initial assignment) in two years. Recourse is had to the interschool contests in order to secure attentive repetitions and to vitalize the process. Motivation is thus secured by appealing to the child's instincts of emulation, rivalry and pride in the prestige of his class and school.

Third, this method of thoroughgoing initial focalization and attentive repetition should have yielded

a high degree of automatic mastery of the spelling of a considerable number of words. As a matter of fact, the spelling efficiency engendered by this spelling technique in the Cleveland schools is quite remarkable, as shown by the following figures.

In the first interschool spelling contest the pupils of the eighth grade averaged 1.5 words per pupil incorrectly spelled in a total of 120 words. In the corresponding test one year later, 1907, or one year after the introduction of the drill described above, the average number of errors per child was only .483 of a word. In 1908 a test, embracing 50 words, given by a specially appointed educational commission in 1905 (consisting of Presidents Howe and Thwing, and Professor Avery), was repeated with all the pupils of the city in the same grade. In the 1908 test the average number of misspelled words per child was three, as against thirteen in 1905. The spelling efficiency had increased from 74 to 94%. Similarly, a test given in Chicago was repeated in 72 eighth grades, giving an *average* spelling efficiency of 84.17%. This figure attains its significance in view of the fact that 84% was the record of the *best* individual eighth grade in Chicago, while a slightly higher percentage was the average of the 72 in Cleveland. Better known is the 1908 N. E. A. Spelling Contest, in which Cleveland scored the highest success. The contest was based upon the Lord-Baylor-Brown-Stone list of words. In this Cleveland totaled 40 errors, while Pittsburg totaled 47, New Orleans 66, and Erie 85. The following year a spelling test given in Cleveland in 1858 was repeated, with the result that the average was one misspelled word less per pupil than in 1858. In one of the early

tests of 1909, given to the pupils of the seventh grade of two schools, composed largely of Jewish children, out of 12,800 possible mistakes only "one boy in each school made one error." In the annual contest of May, 1909, the spelling proficiency in the fifth grade reached 95%; in the sixth grade, 96%; in the seventh, 97.16%, and in the eighth, 97.2, or a general average for these grades of 96.34%.

In the eighth-week contest in November, 1909, 21,290 of 35,098 pupils in the various grades gave perfect returns in both the oral and written contests, and the average was 1.235 incorrectly spelled words for each pupil in both tests.

In the corresponding contests in January, 1910, 17,127 of the 33,364 pupils spelled all the words correctly, and the average number of errors per pupil was 1.698.

In the oral contests of last March, in which 33,928 pupils in the third to eighth grades, inclusive, partook, the number of misspellings was 9,971. The total number of possible chances to misspell was 6,785,600, or, since each pupil spelled only five words, 169,640. This gives an average efficiency of about 94 per cent., which is quite satisfactory in view of the conditions: each pupil received only five chances to spell from a list of 200 words. Perfect grades were obtained by 5,377 pupils. In the written test, on the other hand, in which was included homonyms on which there had been no systematic instruction or drill, the efficiency dropped to 89.6 per cent.

In the annual contest of May 31, 1910, based on 320 words, the average standing for all the pupils—over 33,000—was 94.6% in the oral test, and 96.1 in the written.

Here we have a degree of efficiency produced by the application of certain fundamental elements of the drill that is impressive. Certain facts will add emphasis to this impressiveness. The spelling contests in Cleveland are conducted under rather rigorous conditions: i's not dotted and capitals not properly used count as mistakes; the written work must be corrected by two teachers; a second teacher must keep the record in the oral contests. Furthermore, the spelling drills in the elementary schools of Cleveland consume only 5.96% of the available time, as compared with 7.22%, the average for a number of the leading cities of the country. Moreover, these results present a striking contrast to the results of Rice's column and sentence tests for twenty-one cities of the country.¹ Here the spelling efficiency, as already mentioned, ranged from 53.5 per cent., in the fourth grade, to 84.2%, in the eighth grade. In another test carried out by Rice himself the averages for entire buildings ranged from 73.3 to 77.9%. Only in the case of fifteen schools for the *eighth* grade did the results approximate to any degree perfect scores. This was in the case of a composition test which did not seem to be sufficiently difficult to set any problem to pupils of their attainments. The words used in the Cleveland tests differ for the various grades, and many of them are difficult words. In fact, the lists are compiled from words submitted by the teachers as most frequently misspelled.

Mention should also be made of the Bailey-Manly (2) system of teaching spelling, which the authors assert has proved very effective. Some of the promi-

¹ These tests, repeated in Philadelphia, gave similar results.

nent features of their spellers are: Learning a minimum number of new words each day (three in the second grade); regular reviews of difficult words; the grading of the words; the elimination of difficult, infrequently used words; distinct pronunciation before spelling; sentence and dictation writing; appealing to the various types of memory (auditory, visual and motor presentations); phonic and other drills; calling attention to correct forms and preventing guessing or the writing of the incorrect forms.

Obviously the above facts do not warrant the assertion that *method* in teaching spelling is merely an incidental detail, nor do they lend support to the contention that modern pedagogy demands the substitution of the incidental for the drill method. As will be seen later from our experimental results, it is not a question of drill or no drill, but a question of evolving and economically using a psychologically justifiable and pedagogically efficient drill technique, instead of using slipshod and happy-go-lucky drills. Given such a technique, the vital question at issue will be the question of transfer.

The "spelling grind," no matter how good the technique is, will still be "futile" if the proficiency engendered does not transfer to connected written composition. The incidentalist affirms that it does not, as shown by actual schoolroom tests. Since it is alleged that these do not show transfer, the question resolves itself into determining the reliability or validity of the tests. It can be shown, I believe, that the relevancy of these—or at least those with which I am familiar—may be questioned, because if we would determine experimentally the degree of transferability of spelling efficiency engendered by the

drill to connected writing we must at least make sure that the product we are testing is the result of a genuine drill technique. We must have objective control of the conditions. This is not possible when random tests are made in cities here and there throughout the country, where all sorts of methods have been in use. And when our tests are confined to the schools of one city we have no right to assume that a drill is in vogue simply because special periods are provided in the program for spelling. That fact guarantees at most only one thing: that a certain amount of time is given to the special study of spelling. It signifies nothing regarding the method, or precise technique, employed. Moreover, the tests made have been unfair in yet another respect: the ranking of the papers has been determined by all the words misspelled, regardless of whether they have been subjected to special study or drill. No attempt has been made to experimentally determine transfer of spelling ability on the basis of a list of *test* words which are the same in the "*column*" and "*composition*" tests and which were *acquired* in a *column* drill. And yet this condition is fundamental, particularly in view of the extreme conclusions which have been drawn from the tests thus far made, and particularly in view of the fact that the question of transfer does not mean—and only the more extreme adherents of the drill would so maintain—that, in a language whose orthography is so chaotic and irrational, as is the case with English—the efficiency engendered by drills on a given list of words will spread to any other words whatsoever in the language, no matter how different in orthography, etymology, or in respect to the rules which govern their structure. He

does not urge *universal transferability* in justification of the drill, save at most in the matter of *method* or *ideal*.¹ The method of acquiring words in columns will have something in common with acquiring words in any other way. But he does maintain that the spelling skill developed by column drills will spread to composition work when the elements are identical, or similar, or based upon fundamentally similar laws of structure. Indeed, to justify the column drills it is only necessary to show that ability will transfer when identical elements are present, *i.e.*, when the words are the same. The incidentalist would not affirm that learning to spell certain words in reading and writing sentences will develop a *universal* spelling ability which will enable the child to spell any word which has not occurred in his reading. To make a legitimate and adequate test of the question of transfer, therefore, it is necessary to observe the following conditions: Dictate to the children compositions, relevant to their stage of development and interests, containing among other words a given number of *test* words which have at some previous time been subjected to a thoroughgoing drill treatment in columns. This test should be paralleled by a column test containing the selected list of test words. In correcting the papers only the drill or test words are to be considered. Compliance with these conditions will strip the problem of irrelevant complications, and eliminate all factors save the factor under investigation, which scientific procedure de-

¹ It is not intended to categorically deny the possibility of transfer to subject-matter which is different in nature—a possibility which is at least indicated by a number of recent experiments. But the question may be left open here as it is not essential to the argument.

mands shall be kept under controlled conditions. The question then becomes: Does learning to spell words correctly in one situation result in spelling them correctly in a different situation? To proceed to solve the problem in the usual slap-dash manner is to beg the whole question, if we conceive it in terms of transfer. Accordingly, in the test to be described presently, the attempt has been made to supply the requirements which, as has been shown, are essential to the solution of the particular problem in hand.

Before taking up the question of transfer, however, it will be convenient to consider the differences in spelling efficiency which were found between various schools, grades, ages, and the two sexes.

CHAPTER II.

SPELLING PROFICIENCY AS MEASURED BY SCHOOL AND GRADE TOTALS.

Somewhat over one thousand children in three different public schools in Cleveland, from the fourth to the eighth grade, inclusive, were tested on lists of from forty to fifty words. The lists follow Table I. These words had been given in the regular interschool contests of November, 1909, and January, 1910. Some of the words had been drilled upon in September and October (all those used in schools *A* and *B*, except grades four and five), and the others in October and November. The tests were given in November (the last two days), December and January (see Table I for details), so that the time which had elapsed between the studying of the words and the tests varied from about three to thirteen weeks. School *C* probably offers an exception to this, because the column test for this school was the regular January interschool test, given by the authorities under the usual regulations, for which the children, or at least some of them, probably made some special preparation. My composition test followed this by about one week. For my tests there was, of course, no preparation made by the pupils. In the case of school *A* the composition test preceded the column test, while the reverse was true in school *B*—and in *C*, for the reason already given. The

priority of the tests would not seem to be material in the present case, since the children did not suspect that a second test was coming. Only the class averages could be obtained in the column tests of school C, hence the results are not given separately for the different sections.

The tests were conducted by the principals and teachers of the schools under exacting and detailed written instructions supplied by the writer.¹ The instructions were explained in personal conference with the principals, and the fact that they must be rigidly followed was emphasized. The conditions to be observed were, briefly, the following: The pupils were to be given no aid, and were to be kept in total ignorance regarding the purpose of the tests, except that they were to be told to read through only once the words and compositions dictated to them, and make any corrections of misspellings observed (very few seemed to have profited by this suggestion). The tests were to be held in the various grades tested in a building at the same hour and on the same day. The pupils were to write the words and the compositions from the teacher's dictation. The teacher was asked to dictate clearly. The teachers of the classes tested wrote the compositions. It was explained that they should be simple in character, so that the child

¹ For assistance in this work I am under obligations to Principals Laura K. Collister, Harriet E. Terrell, and Harriet E. Chase; and to the following teachers: Bertha Pratt, Eleanore Mitchell, Edna Newman, L. M. Burke, A. M. Borneman, Mary Payer, Amelia Worswick, Lucy Belding, Rose Walcott, Rena Goss, Mary Armstrong, May Woodley, Harriet Carey, Isabella Campbell, Lulu Slayton, Alice Wightman, Ruth Evans, Lenora Dollins, Irma Collins, Ada Beckwith, Mary Hanrahan, Ettina Wychgel, Mary Martin, Bertha Brown, Edith Tanner, Clara Elmer, Jennie Gleeson, Nanna Ring, Estelle Kramer, and Ida Kelly. Rudolph B. Wallin has aided me in compiling and tabulating the results.

might understand them, and that they must contain all the *test* words and any other words needed to give continuity and meaning to the composition. It was no easy matter, obviously, to patch together a list of selected words of widely varying reference and difficulty into a composition that would read smoothly and make a simple, coherent, intelligible context. It was believed that the teachers, who were constantly in direct touch with the children of the various classes, could do this with the greatest success. Upon examination of the narratives I find that some of them tended to make rather difficult reading, owing to the difficulty of some of the test words. The composition tests were thus carried out under conditions that should be unfavorable rather than favorable for transfer. The correction of the papers was based upon the selected drill or test words, as already explained; and fortunately the drill method in vogue in teaching spelling in the different schools was strictly uniform, as already explained. It will be recalled that the drill technique involved, as a supplementary feature, dictation work. Composition was also an element of the method, supplying the phase of application.

The detailed results of these tests appear in the tables which follow. Our analysis of them may be considered under two headings.

The Transfer of Spelling Efficiency.

TABLE I.

Composition Test.					Column Test (list of words).			
School.	Grade.	Date of Test.	Number of Pupils Tested.	Per cent. of Correct Words.	Date of Test.	Number of Pupils Tested.	Per cent. of Correct Words.	Averages for Both Tests.
A	5 a	11-29	38	84.41	1909	42	91.22	87.81
A	5 b	11-29	24	90.93	12-1	23	96.14	93.53
Ave.	5		62	87.67		65	93.68	90.63
A	6 a	11-30	37	95.90	12-1	39	96.60	96.20
A	6 b	11-30	39	94.16	12-1	38	97.82	95.99
Ave.	6		76	95.03		77	97.21	96.09
A	7 a	11-30	32	91.25	12-1	30	97.33	94.29
A	7 b	11-30	31	93.50	12-1	28	96.40	94.90
Ave.	7		63	92.37		58	96.86	94.59
A	8	11-30	41	92.9	12-2	41	93.90	93.40
A Ave.				91.99			95.41	93.70
B	4 a	12-10	42	98.87	12-9	43	99.01	98.94
B	4 b	12-10	30	96.67	12-9	29	99.06	97.86
Ave.	4		72	97.77		72	99.03	98.40
B	5 a	12-10	43	98.20	12-10	43	99.31	98.75
B	5 b	12-10	43	99.99	12-10	43	99.96	99.97
Ave.	5		86	99.09		86	99.63	99.36
B	6 a	12-10	40	96.88	12-9	44	96.43	96.65
B	6 b	12-10	34	99.92	12-9	34	95.45	97.68
Ave.	6		74	98.40		78	95.94	97.16

TABLE I (Continued).

Composition Test.					Column Test (list of words).			
School.	Grade.	Date of Test.	Number of Pupils Tested.	Per cent. of Correct Words.	Date of Test.	Number of Pupils Tested.	Per cent. of Correct Words.	Averages for Both Tests.
B	7 a	12-10	39	98.60	12-9	36	99.18	98.89
B	7 b	12-10	33	97.70	12-9	30	98.40	98.05
B	7 c	12-10	37	98.02	12-9	38	97.91	97.96
Ave.	7		109	98.10		104	98.49	98.30
B	8 a	12-10	36	96.53	12-9	36	96.52	96.52
B	8 b	12-10	42	96.43	12-9	42	96.49	96.46
Ave.	8		78	96.48		78	96.50	96.49
B Ave.				97.97			97.92	97.94
C	5 a	1-13	37	99.08	1910			
C	5 b	1-13	43	98.50				
Ave.	5		80	98.79	1-6	105	99.12	98.95
C	6 a	1-13	42	99.27				
C	6 b	1-13	18	95.66				
C	6 c	1-13	35	93.30				
Ave.	6		95	96.07	1-6	105	99.16	97.61
C	7 a	1-13	40	98.00				
C	7 b	1-13	18	98.33				
C	7 c	1-13	41	96.20				
Ave.	7		99	97.26	1-6	100	99.14	98.20
C	8 a	1-13	45	98.80				
C	8 b	1-13	42	98.71				
Ave.	8		87	98.75	1-6	87	99.14	98.97
C Ave.				97.72			99.14	98.43

TABLE II.
SUMMARIES.
Averages for All Schools.

B	4		72	97.77		72	99.03
A, B & C	5		228	95.18		256	97.47
A, B & C	6		245	96.50		260	97.43
A, B & C	7		271	95.91		262	98.16
A, B & C	8		206	96.04		206	96.51
			1022	96.28		1056	97.72

Combined Averages for the Composition and Column Tests, All Schools.

Grades. Per cents.	4	5	6	7	8	All grades.
	98.40	96.31	96.95	97.03	96.28	97.00

WORDS USED IN THE SPELLING TESTS.

GRADE 4. SCHOOL B ONLY.

A, B and C refer to the schools tested. The numerals (4 to 8) refer to the grades, and the small letters (a, b, c) to different sections in the grades.

accident	exotic	arctic	nephew
biscuit	indolent	beauty	fringe
poultry	nickname	canary	kidnap
kettle	separate	stolen	oyster
orchard	waiter	walnut	toilet
subtract	cautious	package	yield
aloud	goldenrod	timid	dainty
decimal	kennel	bashful	husband
imitate	oblige	exact	lizard
mayor	rhyme	jostle	needle

GRADE 5. SCHOOL A, 5 b.

The same words were used in 5 a, except that *parish* was substituted for *parrot*.

surname	stirred	believe	moat
protection	recovery	typewriter	harvest
auction	courage	numerator	gild
drudgery	separate	eyelash	wildcarrot
musician	ostrich	crystal	caterpillar
invitation	February	gauze	pedal
woodchuck	cellar	parrot	bruise
chaise	arc	chariot	possessive
abandon	lantern	resign	subtraction
escort	business	lea	falsehood

GRADE 5. SCHOOL B.

The first fifteen words of School A, grade 5, above, were used, and the following:

divine	minstrel	everything	harvest
entice	vegetable	tortoise	industry
overcoat	alcove	crammed	knowledge
parasol	jovial	chariot	bulb
quay	corridor	ballast	partridge
leopard	area	harpoon	pavilion
cistern			

GRADE 5. SCHOOL C.

Most of the above words in Schools A and B, grade 5, and the following: scythe, column, geranium, calyx, parish, fractional, icicle, lightening.

GRADE 6. SCHOOLS A and B.

majority	stencil	scenery	colonist
national	emery	superb	exploration
government	prophecy	frothy	preface
courteous	betray	benzine	paragraph
brilliant	drench	kerosene	interrogative
ambitious	radiator	fertilizer	italic
entrance	scuffle	converse	tributary
shrinkage	radius	terrier	mistletoe
customary	mimic	straighten	smilax
absent	marriage	scheme	numerical

GRADE 6. SCHOOL C.

automobile	calvary	pewter	diamond
magnificent	palatial	caramel	miner
genial	construction	juice	percentage
acquaintance	ravine	regal	attribute
surgeon	tact	hassock	raiser
honorary	assistance	mohair	mucilage
caucus	trustworthy	assess	stationery
acquire	biscuit	obscure	calendar
glacial	doily	peninsula	skein
ancestor	eyelet	tedious	barnacle
invalid	embroidery	masculine	withhold
cutler	colander	creditor	

GRADE 7. Schools A and B.

present	infinitive	monarchy	bilious
wrought	architecture	masquerade	prospective
gigantic	stockade	tonsil	giraffe
weighty	veteran	impossible	decimal
unwelcome	accomplished	biscuit	duchess
tragedy	champion	besieged	venom
reservoir	scientific	valiant	militia
sensitive	obelisk	gesture	
chandelier	insipid	militia	

School A, b used the following additional words: acquit, sediment, delicious, perceive, courtesy, achieve, subtle, while A, a, and B, a, b, and c selected from the following: intrench, mercenary, duplicate, forfeit, soldier, metropolis, quadrille, parquet, avalanche, cancel, vul-
ture.

GRADE 7. SCHOOL C, a, b, and c.

oracle	transitive	vindicate	shampoo
frontier	impede	liberal	profile
vehicle	partial	principle	ledger
caboose	contour	consider	autograph
burrow	visible	obstinate	pendulum
quantity	humidity	concede	circular
burlap	provincial	surpass	irritate
fugitive	grocer	spouse	goggles
dishonor	ammonia	transfer	maxim
active	designate	gouge	capitol
volatile	baritone	couch	conquest
converse	cartridge	bodice	sculptor
abolish	torpedoes		

GRADE 8. SCHOOL B.

persistence	bronchitis	tabernacle	refrigerator
explicit	requisite	guttural	insolvent
affidavit	efficacious	discordant	visible
veracity	hydrogen	alien	wondrous
scrutiny	corpsele	pamphlet	recreant
hospital	incisors	graduate	sirens
development	enthusiasm	kindergarten	rioter
comrades	augment	affirmative	delineate
children's	deficit	illegal	barometer
valvular	exodus	chiffonier	encyclopedia

GRADE 8. SCHOOL A.

Those in B and the following additional words were used: remedies, attendant, synopsis, diversity, feign, competitor, charade, spherical, variable, artesian.

GRADE 8. SCHOOL C.

secession	capacity	centennial	lariat
Americanized	calculated	quartet	contagious
republic	mosaic	uncouth	disinfectant
questionable	glazier	pedestrians	chemistry
sagacity	seraph	naturalized	magnesium
intolerant	modulation	occasion	glycerine
emperor	plenteous	culinary	drama
consistent	promiscuous	suspicion	epitaph
royalist	changeable	subordinate	stenographer
appraise	carmine	emphatic	preservation
accessible	vermillion	mandate	compartment
boundary	pheasant	precedent	delinquent
aquarium	plover		

The words used for the fifth grades were studied during the October-November assignment; those for the sixth, seventh and eighth grades of Schools *A* and *B* were studied during September and October, and of School *C* during October and November.

Fifty words were spelled in all the grades of school *C*; and forty in schools *A* and *B*, except in the eighth grade of school *A*, where fifty were spelled, and the three seventh grade classes of school *B*, and section *b* of school *A*, where forty-four were used, and section *a* of the seventh grade of school *A*, where fifty words were spelled. The results for the seventh grade of school *A* are slightly too low, as some of the markers graded on the basis of forty words and others on the basis of all the words used. The correction of these slight inaccuracies would not have modified the final results to any appreciable extent.

The dictated compositions were identical in the following schools, grades and sections: In school *B*, grade 4, *a* and *b*. In school *A*, 5, *a* and *b*. In school *C*, 5, *a* and *b*. In school *C*, 5, *a* and *b*. In schools *A* and *B*, grade 6, *a* and *b*. In school *C*, 6, *a* and *c*. In schools *A*, 7, *a* and *b*, and *B*, *a*, *b* and *c*. In school *C*, 7, *a*, *b*, and *c*. In schools *A* and *B*, 8. In all other cases the compositions differed in context, but the grading was based on the same lists of words (the lists given above).

The number of pupils tested in the column and composition exercises does not precisely correspond because some of the

pupils were absent on one of the test days. This slight unavoidable irregularity will not, it is believed, alter the final averages to any appreciable extent.

I. *The degree of spelling proficiency shown irrespective of the question of transfer.*—The general average for all schools is 97%. The lowest *building* average (the general average of all grades tested in one building) was 93.7%, and the highest 98.43%—a difference of 4.73%. The lowest *grade* average (the general average of all sections of the same grade for *all* buildings) was 96.31%, fifth grade, and the highest 97.03%, seventh grade—a difference of only .72%. This, however, is exclusive of the fourth grade, 98.40%, in which only 72 pupils in one school were tested. If these are considered, the range of variation is 2.09%. The lowest grade average in a *single* building is 90.63%, in the fifth grade of school *A*, and the highest 99.36% in the fifth grade of school *B*—a difference of 8.73%. The lowest average for any *single section of any grade* of the three schools is 87.81, in section *b* of the fifth grade of school *A*, and the highest 99.97%, in section *b* of the fifth grade of school *B*—a difference of 12.16%. The corresponding extremes in the *composition* series alone are 84.41%, (5*a*, school *A*), and 99.99% (for forty-three pupils in 5*b*, school *B*)—a difference of 15.58%; and for the *column* tests, 91.22% (5*a*, *A*) and 99.96% (5*b*, *B*)—a difference of 8.74%. The greatest *section* difference, *i. e.*, between the averages of the two or three sections of the *same grade*, irrespective of the school, is 15.58% (between 5*a*, composition, school *A*, and 5*b*, composition, *B*), and the smallest variation .03% (8*a* and *b*, column test,

school *B*)—a range of 15.55%. In 4*a* and *b*, column test, school *B*, the difference is only .05%; in *C*, 8*a* and *b*, composition test, .09%; and in *B*, 8*a* and *b*, composition test, 10%. The greatest difference between different sections of the same grade in the *same building* is 6.52% (sections *a* and *b* of grade five, school *A*). These facts furnish data for several important deductions.

First, the general spelling efficiency for all schools shown (97%) is striking. It is 12.6% higher than Kratz's results (84.4%, for the fourth to eighth grades, inclusive), 25% higher than Chancellor's (72%, for 10,000 pupils from the fourth to eighth grade), 25.48% higher than the results in Rice's column test (71.52%), which consisted of a list of dictated words, and 22.42% higher than the results from his sentence test, which consisted of dictated sentences containing 50 test words for the fourth and fifth grades, and 75 words for the sixth, seventh and eighth grades. It eclipses by 25.7% Cornman's average¹ in three term examinations during three years for eighty Philadelphia schools (71.3%), and is 27% higher than the results of these examinations in his two experimental schools (70%), in which the spelling instruction was incidental. In four column tests given to these two schools from September to June and consisting of lists of fifty words differing from grade to grade, the averages were 33%, 49%, 50% and 50% respectively for one school, and 49, 57, 60 and 68% for the other; while

¹ Cornman's figures are based upon the median instead of the average. It has been shown in other experiments that the medians and averages do not always coincide, but that they tend to do so in the latter part of practice series. Sometimes the difference is very considerable. Whether the median is a more valuable measure of typical results than the mean needs to be determined with more accuracy. (12: pp. 243, 256).

the repetition of Rice's column and sentence tests gave an average efficiency in 1897 of 78.9% in one school, and 67.1% in the other, and in 1898 73.1% and 65.4% respectively, for the *column test*. The corresponding averages for the *sentence test* were: 82.3 and 74.6% in 1897, and 76.5 and 77.9% in 1898. It will be observed that there was a loss of efficiency in 1898 except in the case of the sentence test for one school.

Fortunately these results are comparable because they are based upon the same fundamental method: an arbitrarily selected list of words unannounced to the pupils. The contrast with the Cleveland results is most striking. Nowhere can our degree of efficiency be paralleled in Rice's and Cornman's tests, except in their composition tests and in Cornman's series of spontaneously spelled words (the pupils wrote during fifteen minutes as many words as came into their minds). In Rice's composition tests the pupils reproduced a story read to them, or wrote original stories about pictures shown to them, while in Cornman's they wrote compositions and papers in answer to questions in geography, history, language and elementary science. With these tests Rice's efficiencies varied from 99.6 to 95.9%, and Cornman's results for eight tests in one of the experimental schools averaged 97.8%; and for ten tests in the other school, 96.7%. In the three tests given during three successive years on spontaneously written word lists the general average for one of these schools was 95%.

There are reasons why the latter tests cannot be compared with the other tests of these writers or with our own and why no significant conclusions

can be deduced from them. First of all, the range of words used was probably not broad enough to genuinely test spelling efficiency—at least the tests furnish no guarantee that it was, and Rice, by implication if not expressly, concedes that there is a point to this criticism. The words used were probably ordinary, familiar or simple words, or technical words frequently recurring in the lessons. On this point the published records give no information. Moreover, in some of these tests the child had *carte blanche* in the matter of the selection of the words: he was free to choose his own words. It is obvious that the ordinary child in such a situation would select words which were familiar and which could be readily spelled and easily written, in preference to unusual, or difficult words, or words of uncertain orthography. This would tend to cramp his vocabulary in the interest of correct orthography—a situation indeed found to be true in a mass of correspondence examined by Chancellor (4). Even when reproducing stories read to them the children would tend—and the records do not show that they did not—to substitute synonymous words for words difficult to remember or hard to spell; and I presume that an exact literal reproduction was the exception rather than the rule, except where the stories were dictated phrase by phrase. Some such conclusion as this seems almost inescapable. Else why the enormous difference between the spelling efficiency in the column, sentence and composition tests? Why the extraordinary efficiency shown in Rice's picture-story test (99.3%), in which the pupils controlled absolutely the choice of words? The unusual efficiency of the eighth

grade pupils in the test on spontaneously written words, 99%, also indicates as much. The more mature pupils would naturally exercise more judgment in selecting their words. They would hesitate to write words they did not know how to spell, particularly if they had any sort of suspicion that attention would be paid to the spelling by the examiners and particularly if the custom prevailed in these schools of correcting the spelling of the written work. It does not seem therefore that tests of this nature have any particular virtue, or the virtues claimed for them. It is difficult to see how they represent the complex life situations more faithfully than dictated lists or compositions; for it is precisely the lack of the freedom to choose the words of his own preference that characterizes the work of the stenographer, transcriber and amanuensis; and it is just an impoverished vocabulary that a virile writer must shun. If we would arrive at any valid conclusion as to methods of teaching spelling (the drill or the incidental) we seem justified therefore in barring these tests.

But objections may be lodged against the legitimacy of our own tests. It will be well to anticipate and answer these.

(1) It may be urged that the words used were not sufficiently difficult. The words are a matter of record (see pp. 31-34). Many of them were specially selected because the children had tended to misspell them in the past. Comparison with the lists of words used in the tests given by Kratz, Rice and Cornman will show that they compare very favorably in difficulty. Some of the lists are considerably more difficult than Kratz's or Rice's.

Cornman's "review list of difficult words," however, is fully as difficult and is more extensive (four tests).

(2) Since our tests were given to three schools only there is no guarantee that they are typical. Fortunately we are in a position to determine the rank of these schools relative to the other schools in the system, from the official report of the supervisor of spelling for the two eighth-week interschool contests covering the same words. School *A*, it appeared, occupied the 38th, *B* the third, and *C* the 28th rank among somewhat less than one hundred schools. Accordingly these were neither the best nor the worst of the Cleveland schools in spelling efficiency, so far as this particular list of words is concerned. The three together would take rank with the first third. Moreover, while the average number of words misspelled per pupil for all the schools of the city in these two contests was 1.235 and 1.698 respectively, the poorest school did not fall below 5.284 words per child in the November contest, nor below 5.897 in the January contest. Furthermore, since the best building averages in these contests were .059 and .236 words misspelled per pupil, the range of variation amounted to only 5.227 and 5.661 words between the best and poorest building averages. For our three schools the variation between the building averages amounted to 4.73%. These figures are less than the variations found by Rice between eighteen schools (from his Table No. 2), which were 28.2% for the column test (from 92.7 to 64.5%) and 7.4% for the sentence tests (from 79.4 to 72%); and are about as small as his

variations between city averages. With the sentence test his variation was 3.3% between seven cities (from 76.87 to 73.5%); with the column test, 4.2% for twelve cities (74.8 to 70.6%); and with the composition test, 4.6% for fifteen cities (77.9 to 73.3%). That the variation in Cleveland is so small not only indicates the utility of the "spelling grind" in vogue there, but that our results from the three schools tested may be considered fairly representative of the system at large. Even if allowance is made for the fact that the three test schools belong to the upper third in efficiency, the record of the poorest school (it was the same one in both of the interschool contests) is not nearly so low as to reduce the results to the level of efficiency shown in Rice's and Cornman's column and sentence tests. Finally it should be remarked that the results which we have shown in this test are not extremes of the spelling work done recently in Cleveland. They have been duplicated in the interschool contests during the last three years.

(3) It may be objected that our results are based on test words that had been recently drilled. This, of course, is a circumstance of moment. Our words had been drilled or reviewed not more than about three months before the test. Obviously the efficiency will be higher on recently studied words than those remotely studied. To this criticism a couple of replies are pertinent. In the first place, the published records of the other investigators throw no light whatever upon this problem. Undoubtedly some of the words given in their column, sentence and composition tests had been recently attended to or studied: to what extent cannot be

file

even approximately deduced from the records. It is manifest that in the composition tests—the papers in geography, science, etc.—many of the words had to be especially attended to day by day. Nor can we determine from those tests to what extent the words had occurred in specific spelling lessons. In a word, then, for the Cleveland tests we can say almost precisely what the conditions of recency were, but must make such suppositions as seem warranted for the other tests.

Furthermore, there is no known immunity against forgetfulness: it is one of the most persistent traits of consciousness. Not only do memory images grow faint with the lapse of time (and spelling offers no exception), but habits likewise disintegrate. Perhaps there is no habit in the whole field of sensory, intellectual or motor automatisms that can be so well organized and integrated that it will not disintegrate more or less if all repetition or practice is abandoned—whether the habit pertains to the art of piano playing, legerdemain, writing, pronouncing, adding, subtracting, or spelling. Habits perhaps can never be made as stable as reflexes (so Titchener). This is an ultimate that any method will have to reckon with, and it constitutes a defect that cannot be laid at the door of any particular method. Its roots lie deep in the nervous substratum of the psychic life. Nevertheless, it can be confidently affirmed that those habits which have been thoroughly ingrained will resist decay longer than those which have been only partially solidified, or which have been loosely organized by slipshod methods. A completely formed habit is *relatively*, if not absolutely, stable. And it is the claim of the

advocate of the drill that a proper drill technique, consistently applied, will engender a grade of habit organization unattainable by the incidental method of instruction or the incidental method of engendering automatic control of mental tools. The drill is no panacea for forgetfulness. But for mechanical and invariable subject-matter it is the best remedy at our command, particularly if the process is strongly motivated by felt needs to solve practical problems; that is, if the child has been made to feel that his problems can best be solved by developing automatic precision of response through a thoroughgoing drill technique.

It appears therefore that our tests amply demonstrate the superior value of a skillful spelling drill technique for developing orthographic excellence, and signally refute the assertion that *method* in teaching spelling is of no consequence, being at most a subordinate incident. This conclusion will be further buttressed by a consideration of the records in regard to

II. *The relation of spelling efficiency to the grade.*
—The variation from grade to grade in our results is so slight as to be practically negligible, amounting to only .72%, or if we include the fourth grade, 2.12% (from 98.4 to 96.28%). The contrast with Rice's and Cornman's figures arrests attention. In Rice's column test the difference between the 4th and 8th grades amounted to 30.7% (from 84.2 to 53.5%); and in the sentence test, 20.2% (from 84.4 to 64.2%). It must be borne in mind that these differences are between the general averages for twenty-one cities in the first test, and eight in the second, and that the variations between the gross

averages between whole city systems will very probably be less than between individual buildings. In one of Cornman's term examinations for eleven schools the variation between the 3d and 7th grades is 16.2% (from 75.8 to 59.6%); and in another, given to the third to the seventh grades of fifty buildings, it is 5.6% (a reduction owing to the massing of many averages, as suggested above). When he gave Rice's column test in 1898 to one of the experimental schools the difference was 27.2% (from 93.7 to 66.5%); and with the sentence test, 9.9% (from 90.6 to 80.7%). In the four tests based on a selected list of difficult words, the greatest difference was 49% (from 74 to 25%) in one school, and 36% in the other (from 82 to 46%). Even in one of the tests based on the spontaneously written words the difference amounted to 10% (from 99 to 89%). It is only in the latter and in the composition tests that the small grade variation which we have found is equalled.

By analyzing Table I. it will be seen that most of these differences are larger than our differences between the poorest and best grades of a *single* building (8.73%), or the poorest and best *single sections* in any one of the schools (12.16%), or between the different sections of the *same* grade in all the buildings (15.58%).

How may this greater uniformity in spelling efficiency between the various grades of the schools studied in our investigation be explained? Partly, by the fact that we used different lists of words for the different grades, the lists for the lower grades containing orthographically simpler words than those for the higher. This is true in general,

but there are exceptions. Various words given to the lower grades recurred in the higher grades. Pertinent as is this suggestion, the data indicate that this is only one of the contributing causes. For, while Rice's tests were based upon precisely the same words for all classes (except the composition and story tests), and thus give the comparative efficiency of the different grades as measured by the same standard, Cornman used a graded series of words in his 1898 and 1899 column tests, which generally increased in difficulty from grade to grade, and in these tests his variation in the two experimental schools in which the *incidental* method was used is the greatest on record. Even in some of the tests where the pupils wrote the words of their choice the variation is greater than our general grade differences. In the light of these facts, the conclusion seems inescapable: the slight variation in spelling efficiency which we find between the various elementary grades is a function of method technique—not a function of method solely, to be sure, but, so far as our data indicate, to a very considerable extent. The importance of method for the normal child takes creditable rank alongside of such factors as a native "talent," or "knack" or "capacity" for spelling, or a native spelling perverseness or incorrigibility. In cases where there is a pronounced spelling defect, due to cortical lesions or lack of cerebral development, improvement of method must, on the psychical side, take rank with prophylactic and remedial treatment on the physiological side. (This conclusion will be found to harmonize with the judgments of the teachers, as reported in Chapter V).

In our own tests, while the differences are small, as just shown, the fourth grade occupies the highest rank, followed by the 7th, 6th, 5th and 8th in the order named. The order of efficiency found by Rice in the column test is: 8th, 7th, 6th, 5th and 4th grade (same by Cornman); and in the sentence test it is 8, 7, 5, 6, 4. Cornman's order of proficiency in one of the term tests for eleven schools is: 7, 6, 5, 3*b*, 3*a* 4*a* and 4*b*; in the sentence test: 8, 4*a*, 5*b*, 7, 6*a*, 5*a* and 4*a*; in the average of three composition tests for three years: 8, 7, 6, 5, 4, 3; in the column test with words of varying difficulty: 3*a*, 3*b*, 4*a*, 8, 4*b*, 7, 6*b*, 5*a* and *b*, and 6; in the 1900 term examination for 50 schools: 4, 3, 7, 5, and 6; in the same test in 1899 for 19 schools: 6, 4, 3, 7, and 5; and in the lists of spontaneously written words: 8, 7, 6, 5*a*, 4*a*, 4*b*, 5*b*, 3*b* and 3*a*. These figures are complete enough to show that there is not a regular improvement from grade to grade, except in the composition tests, the lists of spontaneously written words, and in the column and sentence tests in which all the grades were given the same words. Measured by an absolute, or at least a uniform, standard, Cornman's and Rice's results evince an improvement from year to year, though the figures do not indicate that it is gradual. Nor do Cornman's and my own results for graded lists of words, differing for each grade, show improvement that is strictly regular. Cornman finds his highest efficiencies in the third and fourth grades, while mine occur in the fourth. This may be due to the simplicity of the words used in these grades, or it may indicate that we have at this period a spelling stage in the child's development, a stage in which his memory for word forms attains

a high degree of efficiency. If so, it would seem that advantage should be taken of this fact by emphasizing spelling in the program in these grades.

One point of interest is Cornman's observation that the fifth grade is a *pons asinorum* in the matter of spelling. The above figures showing the order of ranking, as will be seen, are not conclusive upon this point. Another means by which the question may be settled is to find the amount of *irregularity* within each grade. The following per cents. indicate the range between the best and the poorest averages attained in each grade. The grades which show the least variation come first.

Rice's figures:

Column Test. (Averages for 21 Cities.) Per cent.	Sentence Test. Eight City Averages Per cent.	Column Test. (Averages of Individual Schools.) Per cent.
Grade 7--Range 14.7	Grade 5---- 6.9	Grade 8----Range 15.
" 8-- " 15.9	" 8---- 8.8	" 7---- " 22.
" 5 & 6-- " 19.	" 4----11.6	" 6---- " 32.
" 4-- " 37.9	" 7----11.9	" 5---- " 39.5
	" 6----12.1	" 4---- " 62.
Sentence Tests. (Individual Schools.) Per cent.	Composition Test. (Individual Schools.) Per cent.	Cornman's Term Examination for 50 Schools. Per cent.
Grade 8-----14.4	Grade 8----- .7	Grade 7-----Range 25.2
" 5-----17.2	" 7----- 1.2	" 4----- " 29.4
" 7-----20.5	" 6----- 1.6	" 6----- " 31.
" 6-----23.	" 5----- 1.8	" 5----- " 39.1
" 4-----26.6	" 4----- 2.4	" 3----- " 42.3

I have calculated the M. V., which give a measure of irregularity between the items of a group. for each of the grades in my own test. The figures are based on all the sections.

and in the column and composition test. The results are as follows: .65 for the 6th grade, 1.47 for the 8th, 1.63 for the 7th, and 4.10 for the fifth. In our results we find in the fifth grade the largest M. V.; also both the lowest and highest average for *any* grade in any building; the poorest as well as the best single section in any grade; and the greatest difference between the different sections of the same grade in the same building or in any of the three (the corresponding minimal differences being in the fourth and eighth grades).

My own results, therefore, based upon the grade of proficiency, the amount of irregularity, and the grade of efficiency of the normal or on-time pupils (see the following chapter, particularly Table X., where the pupils have been grouped into slow, fast and on-time sections), are in accord with Cornman's conclusions regarding the fifth grade. But it is noteworthy that this grade is not always the most irregular in Rice's results. We must conclude, I believe, that there is at least an element of uncertainty or irregularity in the spelling work of the fifth grade, which requires further study.

As between the lower and upper grades, the regularity is apparently greater for the grammar grades. But there is danger of dogmatizing on this point, because the records show various discrepancies. The eighth grade seems to possess the strongest claims, so far as concerns the regularity of the curve of efficiency. But even here our results are not in entire accord with Rice's or Cornman's: our small-variation is in the 6th grade. However, we shall return to the matter of the relation of spelling to the age in the following chapter in discussing the relation of spelling to *age*.

CHAPTER III.
THE RELATION OF SPELLING EFFICIENCY
TO SEX AND AGE.

I. *Spelling in relation to sex.*—Girls are more proficient spellers than boys. The difference between the gross averages of all the schools amounts to 2.10%, as seen in Table VIII. There are only two exceptions, the fourth grade of school B, both tests,

TABLE III.
GRADE 4.
Composition Test. (1)

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
B	8	1	1	97.5	1	0	100.00
	9	13	7	98.65	20	10	98.75
	10	12	13	97.29	15	15	97.5
	11	2	0	100.00	4	3	98.12
	12	3	4	96.66	1	4	90.00
Ave.-----	-----	31		98.02	41		96.87

Column Test. (2)

	8	1	0	100.00	1	0	100.
	9	13	4	99.23	21	6	99.28
	10	11	5	98.86	16	9	97.03
	11	2	0	100.00	5	0	100.00
	12	3	1	99.16	1	3	92.5
Ave.-----	-----	30		99.45	44		97.96
Ave. (1), (2)----	-----	61		98.73	85		97.41

and the seventh grade of school *B*, both tests. This conclusion is in entire accord with Rice's and Cornman's results: both found that the girls outstripped the boys. We shall have occasion to recur to this again.

By comparing the various grades it is seen that the girls surpass the boys in all except the fourth grade, where the boys excell by 1.32%. As will be seen from the following figures the girls' superiority

TABLE IV.
GRADE 5.
Composition Test.

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	9	2	7	91.25	2	3	96.25
	10	10	67	83.25	13	39	92.50
	11	12	71	85.20	6	24	90.00
	12	3	24	80.00	5	33	83.50
	13	3	21	82.50	4	22	86.25
	14	1	6	85.00	2	16	80.00
Ave.-----		31		84.53	32		88.08
B	9	4	0	100.00	4	0	100.00
	10	14	4	99.28	18	1	99.86
	11	17	10	98.52	14	7	98.75
	12	3	3	97.50	6	6	97.50
	13	1	1	97.50	3	1	99.16
	14	0	0	----	2	0	100.00
Ave.-----		39		98.56	47		99.21
C	10	20	11	98.90	19	2	99.78
	11	10	17	96.60	15	3	99.60
	12	5	3	98.80	2	2	98.00
	13	2	2	98.00	4	5	97.50
	14	1	1	98.00	1	0	100.00
e.-----		38		98.06	41		98.97
B, C		108		93.71	120		95.42

is most marked in the eighth grade and least marked in the fifth:

Superiority of the girls in the 5th grade, 2.01%

Superiority of the girls in the 6th grade, 2.70%

Superiority of the girls in the 7th grade, 2.22%

Superiority of the girls in the 8th grade, 4.90%.

It is worthy of remark that these results are not corroborated by Cornman's findings. In his investigation the girls' superiority over the boys was most striking in the fourth and fifth school years, the years in which they are relatively weakest in our tests.

If we compare the differences between the boys and girls in single classes in all the schools, we find

Column Test (TABLE IV.)

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	9	2	1	98.75	1	0	100.00
	10	11	42	90.45	12	26	94.58
	11	12	44	90.83	8	9	97.18
	12	3	17	85.83	5	11	94.50
	13	3	10	91.66	5	14	93.00
	14	1	3	92.50	2	4	95.00
Ave.-----		32		91.67	33		95.71
B	9	2	0	100.00	4	0	100.00
	10	18	8	98.88	17	2	99.70
	11	17	1	99.85	13	2	99.61
	12	2	2	97.50	7	2	99.28
	13	0	0	----	3	1	99.16
	14	0	0	----	2	0	100.00
Ave.-----		39		99.05	46		99.62
A, B-----		71		95.36	79		97.66
Ave., both tests		179		94.53	199		96.54

the following to be the largest differences: 7.99% in school *A*, grade 7, composition test; 7.37%, in school *B*, grade 8, column test; 7.23%, *A*, 8, composition; 6.35%, *B*, 8, composition; and 4.14% *A*, 6, composition test. Uniformly the largest differences between the boys and girls are in the upper grades. Contrariwise the smallest differences, with one exception, are in the lower grades: .65%, school *B*, 5, com-

TABLE V.
GRADE 6.
Composition Test.

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
<i>A</i>	10	5	5	97.50	1	0	100.00
	11	21	45	94.64	20	28	96.50
	12	6	22	90.83	9	9	97.50
	13	4	16	90.00	8	13	95.93
	14	2	8	90.00	2	5	93.75
Ave.....		38		92.59	40		96.73
<i>B</i>	10	3	2	98.33	4	1	99.37
	11	11	2	99.54	10	7	98.25
	12	11	22	95.00	9	2	99.44
	13	11	12	97.27	6	6	97.50
	14	3	3	97.50	2	0	100.00
	15	1	0	100.00	0	0	----
	16	1	2	95.00	0	0	----
Ave.....		41		97.52	31		98.91
<i>C</i>	10	1	3	94.00	0	0	----
	11	15	26	96.53	17	26	96.94
	12	15	24	96.80	12	21	96.50
	13	11	11	98.00	10	6	98.80
	14	8	21	94.75	1	4	92.00
	15	2	18	82.00	0	0	----
Ave.....		52		93.68	40		96.06
<i>C</i>		131		94.59	111		97.23

position test; .57%, *B*, 5 column; and .56%, *B*, 7, composition. This indicates that as the boys and girls grow older the girls outstrip the boys in increasing measure. This is no doubt due to the fact that the girls in the upper ages (up to sixteen in these tests) are physiologically and psychologically more mature than the boys. In the lower ages the chronological, physiological and psychological ages are in closer correspondence. Unfortunately there are no data here to show whether the boys would recover in the later adolescent or post-adolescent years. It is possible that as soon as they reach the same plane of maturity as the girls the differences may taper off.

Column Test (TABLE V.)

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	10	4	2	98.75	1	0	100.00
	11	20	13	98.37	21	12	98.57
	12	7	10	96.42	10	5	98.75
	13	4	3	98.12	7	10	96.42
	14	2	9	88.75	2	1	98.75
Ave.-----		37		96.08	41		98.49
B	10	3	0	100.00	5	3	98.50
	11	13	5	99.03	12	24	95.00
	12	10	33	91.75	11	12	97.27
	13	13	32	93.85	5	5	97.50
	14	2	5	93.75	2	2	97.50
	15	1	5	87.50	0	0	----
	16	1	3	92.50	0	0	----
Ave.-----		43		94.05	35		97.15
A, B-----		80		95.06	76		97.82
Ave., both tests		211		94.82	187		97.52

There are only three classes in which the boys excell the girls: school *B*, grade four, both tests; *B*, 7, composition test; and *B*, 7, column test. But if the sex differences are studied in relation to the nature of the tests, an interesting fact will appear; namely, that the superiority of the girls is less striking in the composition series than in the

TABLE VI.
GRADE 7.
Composition Test.

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	11	0	0	-----	2	7	91.25
	12	14	48	91.42	16	32	95.00
	13	7	22	92.14	12	36	92.50
	14	5	37	81.50	1	5	87.50
	15	2	9	88.75	1	1	97.50
	16	1	4	90.00	0	0	-----
Ave.-----		29		84.76	32		92.75
B	11	4	3	98.30	7	6	98.05
	12	18	11	98.61	17	10	98.66
	13	28	22	98.21	18	10	98.73
	14	9	15	96.21	5	6	97.27
	15	0	0	-----	2	2	97.72
	16	0	0	-----	1	3	93.19
Ave.-----		59		97.83	50		97.27
C	11	1	1	98.00	4	7	96.50
	12	8	12	97.00	26	13	99.00
	13	18	35	96.11	19	19	98.00
	14	8	22	94.50	8	10	97.50
	15	1	3	94.00	4	3	98.50
	16	0	0	-----	3	6	96.00
Ave.-----		36		95.92	64		97.58
A, B, C-----		124		92.83	146		95.86

column series, with one exception (seventh grade). The average superiority of the girls in the column tests for all grades, is 3.02%, but for the composition series it is 2.89%. It is interesting to note that the differences are the greatest in the two upper grades, as seen in the following tabulation:—

Amounts by which the girls surpass the boys:

	In the Composi- tion Tests. Per cent.	In the Column Tests. Per cent.	Difference. Per cent.
Grade 5-----	1.71	2.30	.59
“ 6-----	2.64	2.76	.12
“ 7-----	3.03	1.41	1.62
“ 8-----	4.18	5.60	1.42

Column Test (TABLE VI.)

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	11	1	0	100.00	1	0	100.00
	12	13	16	96.92	16	8	98.75
	13	6	9	96.25	10	11	97.25
	14	5	16	92.00	0	0	----
	15	2	3	96.25	0	0	----
	16	1	5	87.50	0	0	----
Ave.-----		28		94.82	27	19	98.66
B	11	3	2	98.48	6	2	99.23
	12	19	9	98.92	17	5	99.33
	13	27	18	98.48	16	4	99.43
	14	9	14	96.71	4	9	94.88
	15	0	0	----	1	0	100.00
	16	0	0	----	1	4	90.90
Ave.-----		58		98.14	45		97.12
A, B-----		86		96.48	72		97.89
Ave., both tests-----		210		94.65	218		96.87

Hence it appears that the girls' superiority is mostly on the side of verbal memory, or the mechanical phases of memorizing. They are less aided by the meaning or content; the thoughts in connected discourse appear to suggest the spelling more with boys than with girls. The results would seem to lend experimental verification to the oft-repeated dictum, that while girls surpass boys in memory work, the boys excell the girls in work requiring

TABLE VII.
GRADE 8.
Composition Test.

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	12	1	2	96.00	2	1	99.00
	13	11	32	94.18	5	15	94.00
	14	9	40	91.11	6	11	96.33
	15	1	2	96.00	6	27	91.00
	16	2	28	72.00	0	0	----
Ave.-----		24		87.85	19		95.08
B	12	5	13	93.50	6	6	97.50
	13	12	10	97.91	16	9	98.59
	14	6	8	96.66	18	31	95.69
	15	2	17	78.75	10	12	97.00
	16	1	4	90.00	1	1	97.50
	17	0	0	----	1	0	100.00
Ave.-----		26		91.36	52		97.71
C	12	1	0	100.00	3	0	100.00
	13	17	8	99.05	10	2	99.60
	14	10	4	99.20	18	12	98.66
	15	11	11	98.00	12	7	98.83
	16	2	1	99.00	2	7	93.00
Ave.-----		41		99.05	45		98.01
A, B, C.-----		91		92.75	116		96.93

judgment, reasoning, reflection. This is particularly true, so far as these results indicate, for the older boys.

The greater variability in spelling efficiency which we find among boys is in harmony with the fact that the psychical variability is greater for boys than for girls. The Germans have no name for girl prodigy, but they have "Wunderknabe" and "Wunderkind." There are more geniuses and prodigies as well as defectives and degenerates in the male sex.

Column Test (TABLE VII.)

School.	Age.	Boys.			Girls.		
		No.	Errors.	Per cent.	No.	Errors.	Per cent.
A	12	1	0	100.00	2	2	98.00
	13	11	30	94.54	5	7	97.50
	14	9	22	95.11	6	9	97.00
	15	1	1	98.00	6	21	93.00
	16	2	25	75.00	0	0	----
		—	—	—	—	—	—
Ave.-----		24		92.53	19		96.37
B	12	5	11	94.50	5	4	98.00
	13	12	18	96.25	15	12	98.00
	14	6	3	98.75	18	21	97.08
	15	2	19	76.25	11	13	97.04
	16	1	6	85.00	1	1	97.50
	17	0	0	----	1	1	97.50
		—	—	—	—	—	—
Ave.-----		26		90.15	51		97.52
A, B-----		50		91.34	70		96.94
	—	—	—	—	—	—	—
Ave., both tests-----		141		92.04	186		96.94

No., total number of pupils (not averages). Errors, stated in totals. Per cent. always means per cent. of efficiency. A. B. C. refers to the three different schools tested.

II. *Spelling in relation to age.*—An examination of Table IX. would seem to indicate that the younger the child the greater is the spelling proficiency. The falling off is regular from grade to grade, with two exceptions, the order being: age 8, 9, 11, 10, 13, 12, 14, 15 and 16 (for details see the Table). The extreme variability, between the 9th and 16th years amounts to 7% (or 7.74% if we include the 8th year old pupils, but there are only four of these). The differ-

TABLE VIII.
SUMMARIES OF SEX DIFFERENCES.

Grade.	Test.	Boys.		Girls.	
		No.	Per cent.	No.	Per cent.
Fourth----	Composition--	31	98.02	41	96.87
	Column-----	30	99.45	44	97.96
Ave.-----		61	98.73	85	97.41
Fifth ----	Composition--	108	93.71	120	95.42
	Column-----	71	95.36	79	97.66
Ave.-----		179	94.53	199	96.54
Sixth ----	Composition--	131	94.59	111	97.23
	Column-----	80	95.06	76	97.82
Ave.-----		211	94.82	187	97.52
Seventh---	Composition--	124	92.83	146	95.86
	Column-----	86	96.48	72	97.89
Ave.-----		210	94.65	218	96.87
Eighth----	Composition--	91	92.75	116	96.93
	Column-----	50	91.34	70	96.94
Ave.-----		141	92.04	186	96.94
Ave. for all grades--			94.95		97.05

No., number of pupils (always totals). Per cent. = % of efficiency.

TABLE IX.

SUMMARIES OF AGE DIFFERENCES.

SCHOOL GRADES										
Age 8.						Age 9.				
Grade.	Boys.		Girls.		Ave. Per cent.	Boys.		Girls.		Ave. Per cent.
	No.	Per cent.	No.	Per cent.		No.	Per cent.	No.	Per cent.	
Fourth.....	2	98.75	2	100.00	99.37	26	98.94	41	99.01	98.97
Fifth.....	--	---	--	---	---	10	97.50	11	99.06	98.28
Ave.....							98.22		99.03	98.62
Age 10.						Age 11.				
Fourth.....	23	98.07	31	97.26	97.66	4	100.00	9	99.06	99.53
Fifth.....	73	94.15	79	97.28	95.71	68	94.20	56	97.02	95.61
Sixth.....	16	97.71	11	99.46	98.58	80	97.62	80	97.05	97.33
Seventh.....	--	---	--	---	---	9	98.69	20	97.00	97.84
Ave.....		96.64		98.00	97.31		97.63		97.53	97.60
Age 12.						Age 13.				
Fourth.....	6	97.91	7	91.25	94.58	--	---	--	---	---
Fifth.....	16	91.92	25	94.55	93.23	9	92.41	19	95.01	93.71
Sixth.....	49	94.16	51	98.29	96.22	43	95.45	36	97.23	96.34
Seventh.....	72	96.57	92	98.15	97.36	86	96.23	75	97.18	96.70
Eighth.....	13	96.80	18	98.50	97.65	63	96.38	51	97.53	96.95
Ave.....		95.47		96.15	95.81		95.12		96.74	95.92
Age 14.						Age 15.				
Fifth.....	3	91.83	9	95.00	93.41	--	---	--	---	---
Sixth.....	17	92.95	9	96.40	94.67	4	89.83	--	---	89.83
Seventh.....	36	92.18	18	94.29	93.23	5	93.00	8	98.43	95.71
Eighth.....	40	96.16	66	96.95	96.55	17	89.40	45	95.37	92.38
Ave.....		93.28		95.66	94.46		90.74		96.90	92.64
Age 16.										
Sixth.....	2	93.75	--	---	93.75					
Seventh.....	2	88.75	5	93.36	91.05					
Eighth.....	8	84.20	4	96.00	90.10					
Ave.....		88.90		94.68	91.63					

Ave., average for both sexes.

ences between the successive years are as follows: .75%, 1.31%, .29%, 1.79%, .11%, 1.31%, 1.82% and 1.01%. In no case do they exceed 2%, so that the variation from year to year is small.

Comparing the efficiencies for the boys and girls at various ages, we find that the boys are inferior for every age except the 11th (where the difference is only .11%). This confirms the conclusion already reached in respect to grade differences between the sexes. The amount of the differences for the various ages, exclusive of the eighth and eleventh, are as follows: .81%, 1.36, .68, 1.62, 2.38, 6.16 and 5.78%. Here it will be seen that the maximum variation between the sexes is quite considerable, over 6% (in the fifteenth year). The differences are most striking for the three higher years, 14, 15 and 16 (the details may, again, be found in the Table).

The above figures may, obviously, be somewhat deceptive, because it usually happens that a given age spreads through several grades. For example: twelve-year old pupils are found in all the grades from the fourth to the eighth inclusive, and the sixteen-year olds in grades six to eight, so prevalent are the retarded and accelerated pupils. Since some of the pupils are excessively retarded and some are accelerated, it will be necessary, in order to obtain a just basis of comparison, to group the pupils in each grade into three divisions: (1) those who are accelerated or under-age; (2) those who are on time or normal; and (3) those who are retarded or over-age. Such a grouping appears in Table X.

It will be observed that two ages are averaged in the "normal age" column. This is due to the fact that children enter the first year in the Cleveland schools both in September and February. Those

TABLE X.

Classification of Pupils into Groups According as They
Are Normal, Accelerated or Retarded.

Fourth Grade.

	On Time. (Normal Age.)			Accelerated. (Under Age.)			Retarded. (Over Age.)			
	Age.	Boys. Per cent.	Girls. Per cent.	Age.	Boys. Per cent.	Girls. Per cent.	Age.	Boys. Per cent.	Age.	Girls. Per cent.
Comp. ---	9 & 10	97.97	98.12	8	97.5	100.00	11 & 12	98.33	11 & 12	94.06
Column---	9 & 10	99.04	98.15	8	100.00	100.00	11 & 12	99.58	11 & 12	96.25
Ave.---	-----	98.50	98.13		98.75	100.00		98.95		95.15

Fifth Grade.

Comp. ---	10 & 11	93.62	96.72	9	95.62	98.12	12, 13 & 14	92.16	-----	93.54
Column---	10 & 11	95.00	97.77	9	97.37	100.00	12, 13 & 14	91.87	-----	96.82
Ave.---	-----	94.31	97.24		97.49	99.06		92.01		95.18

Sixth Grade.

Comp. ---	11 & 12	95.55	97.22	10	96.61	99.68	13-16	93.83	13 & 14	96.33
Column---	11 & 12	96.39	97.39	10	99.37	99.25	13-16	92.41	13 & 14	97.54
Ave.---	-----	95.97	97.45		97.99	99.46		93.12		96.93

Seventh Grade.

Comp. ---	12 & 13	95.58	96.98	11	98.15	95.26	14-16	90.82	14-16	95.64
Column---	12 & 13	97.64	98.69	11	99.24	99.61	14-16	93.11	14-16	95.26
Ave.---	-----	96.61	97.83		98.69	97.43		91.96		95.45

Eighth Grade.

Comp. ---	13 & 14	96.35	97.14	12	96.50	98.50	15-16	88.96	15-17	96.06
Column---	13 & 14	96.16	97.39	12	97.25	98.00	15-16	83.56	15-17	96.00
Ave.---	-----	96.25	97.26		96.87	98.25		86.26		96.03
Gen. Ave.	-----	96.32	97.58		97.95	98.84		92.46		95.74
		96.95			98.39			94.10		

Comp., composition tests. Column, column tests.

who are not six in September must wait till February. Accordingly two ages represent the normal throughout the course. The table reveals a number of significant facts.

An examination of the on-time column shows not only that the spelling efficiency is remarkably constant, but that the apparent decline of efficiency from grade to grade, to which we directed attention above, is due to averaging the results of pupils of different ages in the same grade. This practice is questionable because the holdovers, who are laggards, will outnumber the accelerated or over-bright, and thus tend to distort the normal curve by producing a fall with increase of grade. As will be seen in a moment, the variability for the laggards is also greater. The typical results, therefore, must be based upon the normal children; that is, those who keep up with the normal procession, who arrive on time. When the on-time pupils are considered separately it is seen from the table that the spelling proficiency tends to increase rather than decrease from grade to grade (the two exceptions are the fourth and eighth grades).

When the proficiencies of the normal pupils are compared with the accelerated (under-age), it is seen that the latter spell better than the former in every grade (the girls of the seventh grade excepted). The difference between the general averages for all grades is 1.44%, while the largest difference is 3.18%, for the boys in the fifth grade. On the other hand, the over-age pupils are inferior to the normal all along for both boys and girls except for the boys in grade four. Here the difference between the general averages is larger, 2.85%, the

largest difference being about 10% (boys of grade eight). That is, the variation of the retarded pupils from the normal efficiency is greater than the variation of the accelerated. The over-age pupils are more pronouncedly inferior to the on-time or typical child than the accelerated or under-age is superior.¹ The possible range downward is greater than the range upward. The difference between the averages for the accelerated and retarded amounts to as much as 4.29%.

It is noticeable that the differences are again more pronounced for the boys than for the girls. For the boys the variation between the on-time and under-age amounts to 1.63%, and between the on-time and over-age, 3.86%; while the corresponding differences for the girls are 1.26 and 1.84%. This sustains the conclusion already reached. In spelling girls appear clearly to excel, but to a less degree in composition spelling than column spelling.

Similar results have been obtained by Rice. His data are based upon a study of the elementary grades of a few schools. He divided the pupils in each grade into two groups, the younger and the older. His groups may correspond to our accelerated and retarded. He had no normal group. His results showed that the younger (under-age) pupils spelled better in all grades (four exceptions each in the column and composition tests), the differences varying all the way from about .5% to 11%. By classifying the pupils into four groups according to their general intelligence or brightness, it ap-

¹This would probably not be true if the typical children had not been brought to a high degree of efficiency.

peared that practically all the groups of bright pupils averaged higher than the other groups, the differences usually being quite striking. A high or low class proficiency in spelling may therefore sometimes be explained by the fact that the class contains numerous bright or dull pupils. To rightly estimate a teacher's ability to instruct and train, supervisors should accordingly base their judgment upon the proficiencies displayed by the on-time group of children. Perhaps no better criterion by which to judge a teacher's efficiency can be found than the relative progress made by the normal or typical pupils in her class, as compared with a similar group in other classes.

CHAPTER IV.
DOES SPELLING EFFICIENCY ACQUIRED IN
COLUMN DRILLS TRANSFER TO
DICTATED COMPOSITIONS?

(The Doctrine of Formal Discipline.)

It was primarily for the purpose of throwing light upon this question that the present investigation was undertaken under the test conditions which have already been described (see Chapter I). The data obtained furnishes conclusive evidence in favor of an affirmative answer. An analysis of Tables I. and II. will reveal a number of important facts.

Taking the gross results for all schools as a basis of comparison, it is seen that the difference between the column and composition tests amounts to only 1.44%. That is to say, the average loss of efficiency through transfer is so slight as to be almost negligible.

By comparing the results of the two tests for the various grades separately, we find the transfer losses to be the following: .47% for the eighth grade; .93%, sixth grade; 1.26%, fourth grade; 2.25%, seventh grade; and 2.29%, fifth grade (see Table II.). The smallest losses come in the eighth and sixth grades, and the largest in the seventh and fifth. In the eighth the loss is less than one-half of one per cent.; and it is noteworthy that the variation between the smallest and largest losses is only 1.87%.

times better. However fundamental the law of association, the principle of dissociation is also operative. While the mere repetition of word lists tends to form associations between words which have no bond save that of arbitrary sequence to link them together, in consequence of which the correct spelling of one word will tend to call up the correct spelling of other words if they occur in the given series, yet the mind abstracts, analyzes and dissociates at the same time, so that when the words occur in different combinations they may still be handled with equal or nearly equal proficiency and sometimes with increased proficiency. That there should be an actual increase of proficiency is, after all, not so surprising, because when the words occur in meaningful sequences a new associate is added to further the process of recall, namely the element of meaning. The meaning content will tend to suggest the spelling form, because the form is often deliberately associated with the meaning, so that when the meaning is supplied by phrases and sentences the spelling will follow as the "associated" term of the process. The meaning of the sentence will, therefore, supply the meaning of a given word, and this in turn will revive its proper spelling.

The objection may be forthcoming that these striking transfer results are due to a happy circumstance in the test conditions: *viz.*, the fact that only a few months at the utmost had elapsed between the special study of the words and the giving of the tests. Obviously if the tests had been given after a lapse of several years the proficiency might very well have been less—especially if the lists contained numerous words of infrequent use. The

objection is of no material consequence, however; for no matter how large the falling off in proficiency, it would have pertained to both series. The efficiency would have been lessened in both column and composition work. There is no warrant for assuming that the spelling would have deteriorated in connected writing only; *i. e.*, that the transfer loss would have been exaggerated. Assuming the correctness of these premises, we may say, then, that no matter what the extent of the loss through lapse of time, it cannot be regarded as a transfer loss. Consequently the objection simply reduces to this: after the lapse of a year or more the ability to spell neglected, difficult or unusual words is lessened. When stated in this form, it will be seen that the objection has already been met (p. 42): while a skillful spelling drill is not an unfailing cureall for the forgetfulness of word forms, it does insure a measure of habituation or organized stability that cannot be reached by teaching spelling in a merely incidental way (which in many cases means perfunctory).

It is pertinent to restate that the spelling drill in use in Cleveland involves a certain amount of dictation work as a regular feature, so that the pupils were familiar with the demand that the words focalized in the drill proper be spelled correctly in connected discourse; and that an insistence upon teaching spelling in drills does not necessitate the supplanting or elimination of the incidental method. The two methods are not antithetical or mutually exclusive, but supplementary. A drill that bars the correlation of spelling teaching with the written work of the schools stands self-condemned. This is

not because spelling efficiency cannot be attained by such a drill, but because it would test knowledge merely by the method of formal reproduction, instead of the more vital method of use or application. It would devitalize the process, unless extrinsic incentives were added to infuse energy into the technique. Learning becomes most natural and economical when it is motivated by a need that arises out of the pupil's own experience. Such a need is intrinsic and dynamic, instead of extrinsic and academic. To experience a need the pupil must first be made to feel privation or want. It is the lack of a contemplated good that stimulates the desire for it. The feeling of want, desire, need, can best be aroused in the pupil by confronting him with natural situations or problems, *i. e.*, problems which arise in the course of his regular occupations, plays, or studies. When the child has a composition, or letter, or theme, or a narrative of his day's exploits to write, the problem of spelling becomes a matter of vital concern to him. When the child, in addition, has become imbued with the idea of writing a note to some one in particular whom he regards, to one of his comrades, or to his mother, or to his teacher, the need becomes still more closely identified with his own personal wants and desires. Lack of control in such a case reinvigorates the felt motivation. By supplying real problems to create a breakdown in the child's experience, because he has failed to master certain instruments, forms, symbols or contents, we take the most important step toward their acquisition or mastery. It is a basic psychological demand that the introduction and establishment of technique should be motivated by an *internal im-*

pulse originating from the child's own feeling of a lack of facility in dealing with his varied active experiences and constructive work. But while the form work must thus be vitalized by intrinsic and internal needs, nothing can bring it to a state of facile control except focalized reiteration.

The assumed antithesis between the drill and incidental methods of teaching spelling should resolve itself therefore into a difference in the placing of emphasis. The advocate of the drill is inclined to attach paramount importance to the drill. He does not thereby abjure or discard the incidental method. He regards it as an indispensable auxiliary, a vitalizing supplement, which adds variety to the drill, which tests knowledge by the most reliable method, its application in concrete and real situations, and which thus directly indicates to the child the great utility of spelling as an instrument of social control. The supporter of the drill no more demands the elimination of the incidental method than he rejects the method of testing acquisition by its results and its practical employment. The incidentalist, on the other hand, places the emphasis on the incidental method. In fact, it is probably correct to say that the incidentalist is the more radical of the two, for often he does not stop with the subordination of the drill, but demands its complete abolition. He can apprehend no virtue in anything that smacks of the formal, or methodical, or rigid. Spontaneity and initiative loom so large above his mental horizon that he cannot apprehend the necessity of a rigid treatment of the hidden, underlying routine elements, the facile control of which makes spontaneity really efficacious. We believe that the facts and arguments

presented in these pages show unequivocally that the position of the extreme incidentalist is untenable, and that the complete proscription of the drill is based largely on purely theoretical and sentimental grounds (some of the main objections were considered in Chapter I.).

Having established the fact of transfer, what account can be offered in explanation? Transfer of acquired capacities or powers in general forces us to assume that mental traits are not specialized to an absolute extent, or else that, though specialized, they contain common elements. These common elements are both physiological and psychological. On the physiological side, we find that our psychical activities are functionally connected with certain definite cortical areas. Particular cortical cells are related to highly differentiated capacities, so that we may have a good memory for dates or faces, but not for days, or principles, or classifications; or we may have a good memory for words seen, but not words heard or written. It would, therefore, seem that we have an innumerable number of particular traits, but few general powers. However correct this account may be, there is no evidence that the localization is absolute, so that we have a distinct area or neurone for every pitch, or every adjective, or every odor. Nor is there any evidence that the areas are discrete, independent, unrelated, like water tight compartments, or like the isolated faculties or organs of the faculty psychology or the phrenologist. It is highly probable that not only are there common elements in the various differentiated areas, but that there is an interconnection, intercommunication, and interdependence between

them. Neural life is an integrated solidarity. It would appear, therefore, that modifications produced in a given area will not only spread to common elements within that area but to the neighboring regions. If we assume that there may be an *overlapping* of some of the areas, we need not even resort to a theory of spreading, for the overlapping areas (overlapping in function) would be jointly exercised. It is also possible that there may be certain regions of the nature of *transfer points*—say, certain association areas—from which the effects irradiate. Hence if we accept as correct the assumption that our capacities are far more specialized than generalized, still all training must generalize more or less since the neural substrate consists of a network so closely interwoven as to make presumptively probable that the cortex will act more or less as a unity. In fact so closely connected are the neural elements that the entire nervous system is an integrated unity, and acts largely as such. That this is so is evidenced by the phenomena of *reflex neuroses* and the restitution of mental functions. A diseased organ or pain in a nerve will often reflect its disorder through the sensory and motor neurones to some other part of the body. Unequal visual acuity of the two eyes or eye strain will often manifest itself in the form of a headache; or of gastric trouble, choreic symptoms, muscular twitching, epileptiform convulsions, torticollis, spinal curvature, paralysis, insanity, etc.; indigestion will often manifest itself in the form of nervousness or forgetfulness, and even flatfootedness will excite neuroses in distant portions of the body. The facts of *vicarious functioning* are equally well known. When certain

cortical areas have been extirpated other areas will often gradually assume the functions temporarily abrogated. Cortical areas accordingly are not like the segregated islands of the ocean, but like the interconnecting straits.

On the psychical side, the tendency of training to generalize or transfer rests upon three possibilities. First, that there is an *identity of substance* or content in the two situations (the practised and unpractised). Thus the knowledge contents that have been acquired in drills on the mathematical tables and processes recur in physics or chemistry or quantitative experimental psychology. The power developed in mathematical study will, accordingly, transfer to these branches, because the substance is identical. Second, an *identity of method* or procedure (Thorndike). There are the same elements of method in experimental work in chemistry as in biology, physics, or psychology, hence the mastery of method in one experimental branch will transfer more or less to another. The same holds good in the case of language method. Third, there may be an *identity of ideal* or aim (Ruediger). When the child is made to focus attention upon neatness, industry and honesty, so that they are made conscious ideals, these virtues will generalize.

In these various ways do we find it possible to explain how the development of specific powers will insure a certain measure of general training or transfer. Now, obviously, so far as spelling is concerned we have a perfectly clear instance of identity of substance. The words that occur in drills are the same that occur in written discourse. There is only a difference of setting or of situation. To a certain

extent the method is identical also; for while the incidental method is not based upon the thorough-going repetition involved in the drill, yet in both methods the forms must be more or less focalized in order to enter consciousness, and in both cases they receive more or less repeated attention. Identity of aim can likewise be insured by consciously directing the child's attention in the spelling drill to the fact that the aim of the drill is the production of spelling accuracy in all written work. It is obvious that this element is also stressed when the drill includes dictation or writing in sentences. That the same cerebral areas are operative in drill work as in incidental spelling, is an incontestable conclusion, I believe. In the light of these considerations it would indeed be surprising if the spelling efficiency engendered in column drills did not directly transfer to connected writing.

There is a point of practical consequence that should not be overlooked. Since it is not contended that spelling drills produce a universal generalized spelling proficiency which will spread to *all* words, whether they have been studied or not (nothing beyond an *increased facility* to master new forms need be assumed; in fact such increased facility for doing other lines of work is well attested by experiment); and since it has been shown that the ability developed in drills will at least transfer to situations of a different nature, when the elements are similar or identical; it follows that the materials of the drills should consist of those words which are most likely to be used in the actual workaday experiences of the child and the average adult. There is slight justification for formal spelling drills on very unusual or hard

words merely for the sake of the exercise or for the sake of developing a knack or skill for learning words. Contents that have intrinsic value, when properly taught, have just as good formal or training value as contents of no intrinsic value whatsoever. The formal value of a content is quite independent of whether or not it has intrinsic value; the formal value depends on method and motivation. The practical problem then becomes one of a judicious choice of words; and this is a problem which is extremely hard to solve. What words are worth while? Which will have a genuine value in the child's later experiences? What words have such a practical value that they should be learned by all? It is doubtful whether this question will admit of an entirely satisfactory solution because of the highly specialized nature of the modern professional and occupational environment into which the child must be fitted. Here, if anywhere, "what is food to one is poison to another." A list of words which would excellently qualify a boy for efficient dictation work in a railway office would be of slight service in a physician's office. Nevertheless there are those who believe a minimum list of words can be made out whose spelling should be thoroughly mastered by every grammar school graduate (Chancellor proposes a list of 1000 of such words: 4).

CHAPTER V.
THE SPELLING DRILL IN VOGUE IN CLEVELAND
AS VIEWED BY PRINCIPALS
AND TEACHERS IN THE ELEMENTARY SCHOOLS.

In order to obtain the opinions of principals and teachers in the Cleveland elementary schools respecting the satisfactoriness of the spelling method now in use, a questionnaire was addressed to the principals. The questionnaire asked for specific answers to a series of specific questions, twelve in number. Care was taken to emphasize the fact that "what is wanted in all cases is a frank, unbiased expression of opinion," and the assurance was also given that the answers would be considered confidential. From the limited number of replies received it appears that many of the principals could not bring themselves to see that the writer's interest in the enquiry was purely scientific and that there was no ulterior motive.

The circular was answered by sixteen principals and eight classroom teachers. The principals consulted with a considerable number of classroom teachers of spelling, so that the replies represent a larger census than sometimes appears from the tabulation. The teaching and supervising experience of the principals varied from thirteen to forty-two years, and the eight teachers directly reporting to

me had taught from three to nineteen years, the majority over fourteen years.

Nine of the respondents had never taught spelling by the incidental method. Fourteen had used this method, but never exclusively, and a number of the teachers interviewed had employed the method more or less. Respecting the value of this method of teaching spelling, the opinions varied. Only two seemed to favor it as the sole method. Seventeen regarded it as a satisfactory method when combined with the special study of spelling. The virtues found in the incidental method were the following: it supplies the child with a rich and varied vocabulary of commonly used and comprehensible words (mentioned four times); the context supplies a meaning to the words learned, and this aids the memorizing of the spelling (mentioned twice); the words frequently recur, and thus drill is provided (once); it is the most natural method of spelling, as words are spelled in connection with other words and in connection with manuscript writing, and this increases the ability to *use* words correctly, *i. e.*, to use them in the only way in which they must be spelled in later life (thirteen times¹); it improves manuscript spelling (three times). Some did not regard the incidental method as satisfactory, on the ground that it is not thorough (mentioned three times), or it is slipshod and unmethodical (two times), or it cultivates a lack of responsibility (once), or it does not encourage intensive study (once), or it takes time from the regular subject taught (three times), or it gives a spelling mastery over a range of words that is too limited (three times).

¹ These figures refer to the number of mentions.

All the respondents, as well as all the teachers interviewed by the principals, are thoroughly familiar with the present spelling method in use in the Cleveland schools, as they have followed it since it was introduced. Sixty-one of these approved of the method, while eighteen favored it to a certain extent, or subject to certain modifications. We may first consider the defects of the method, or the objections urged against it. The most frequent objections related to the contests and the character of the words. The contests are too numerous (mentioned four times; they produce too much unrest (three times), or nerve strain (eleven times), especially during the contests (five times); they subject the schools to unfair comparisons, because of the difference in conditions in the different districts, especially with respect to the presence of newly arrived immigrants (three times); and they create the temptation on the part of overzealous teachers to devote more than the statutory time to spelling, and thus slight other branches (twelve times), especially in preparing the long list of words for the oral contests. The objections against the words were that they are too difficult, especially for the primary grades (three times), or for the children in foreign districts (ten times); or that there should be more than two dominant words (once), one preferring five each day, while one preferred more dominant words and less review or subordinate words. Four held that the general spelling was not improved; and two, that there is insufficient correlation with the daily written work. One found fault with the presence of watchers, and one with the necessity of learning the short sounds of vowels.

The merits of the method were more strikingly emphasized. Its drill features were most frequently commended (mentioned seventy times). The characteristics of the drill most often emphasized were: the intensive study or drill of two dominant words each day (mentioned thirty times); drill in written work, and the writing of the dominant words in sentences, which develops care in spelling words correctly in connected writing (nine times); the constant reviews, daily, term and annual (four times); oral drills, which aid the ear-minded children (three times); and the peculiar value which the drill on a limited number of dominant words has for the poor spellers (twelve times), in enabling them to catch up with the bright pupils, as it is possible to insist on the poorest spellers mastering the limited number of words assigned. Another commendatory feature was the interschool contests, which stimulate interest in spelling, and incite the children to do their best (six times). There appears therefore to be a division of opinion among the teachers as to the propriety of the contests. The method was commended furthermore because it emphasizes syllabification (ten times), and learning the vowel sounds, phonetic and diacritical markings (six times), all of which makes for correct pronunciation, distinct enunciation and better reading (seven times); it requires the study of the meaning of words (six times), it increases the child's vocabulary (six times), and improves his general spelling (four times).

respondents were asked to state whether any improvement had been observed in spelling in Cleveland since the method was introduced, and also to

estimate the amount of the increase as far as that could be done. Some (three) considered that the efficiency had been greatly increased for the words studied, but that the improvement in composition work did not measure up to expectations, one explaining this as due to the fact that the words studied did not supply the needed vocabulary for the work required in composition. One reported that the gain was not great, explaining that in her school 90% of the pupils were recent immigrants who did not understand the meaning of the words. All the others who answered the question reported a striking increase in spelling efficiency, four stating that this applied to both the oral and written spelling, six that the improvement was marked in all lines of written work, and several that it was especially marked with the poor spellers. One principal estimated the improvement at 25% (for the words assigned in the spelling lesson), two at 50% (one said this was true for the papers in all studies), five at 100%, and one at from 150% to 250% (especially for some of the poor spellers).

From the point of view of the majority opinion of the principals and teachers, it is thus apparent that the drill method of teaching spelling now in use in Cleveland is more satisfactory than any other method used by the respondents (three, however, considered that it is not).

CHAPTER VI.

SUMMARY OF CONCLUSIONS.

There are various important conclusions suggested by our study of spelling, which may be summarized in the following statements:

✓ 1. Syllabification is an aid to spelling, pronunciation and enunciation. It aids the child in talking and reading more distinctly.

2. Interschool contests revive interest in spelling and vitalize the work, but they are attended by various dangers, and the comparisons are not always just measures of the relative efficiency of the work done in different schools, because conditions vary widely. They do furnish legitimate incentives and ✓ effective stimuli, but require careful regulation.

3. Spelling efficiency is a function of spelling method, perhaps to a greater extent than it is a function of any other factor. Better spellers can be produced by the employment of a rational drill. ✓ There is no other specific that will rank with a *good drill* as an effective remedy for poor spelling.

4. Two of the prime elements of a good spelling drill are the intensive daily focalization of consciousness upon a limited number of words, and attentive follow-up drills or reviews, which should be continued until a state of relative automatism has
sued.

5. The drill should not be employed exclusively. Incorrect spelling should be corrected in all the written work, and correct spelling should be made a conscious ideal in all studies. Incidental teaching should therefore supplement the drill. It is needed to vitalize the work, and to develop the ability to use or apply what has been learned in actual practice.

6. Instruction in spelling, however, should be essentially a process of *teaching* instead of *unteaching*; i. e., the pupil should be given as little opportunity as possible to acquire incorrect spellings. Spelling lessons should not be confined to teaching the orthography of words which it has been discovered the child has misspelled. The *correct forms* should be *anticipated*, both in the incidental exercises and the drills.

7. The words selected for intensive drill treatment should vary according to the character of the school population. The words for the average school are too difficult for a "steamer" school. There should be separate lists for foreign children, for the younger children, and, in the advanced classes, for children preparing for specialized vocations. Moreover, it is also important to emphasize that—

8. The words selected should be identical with the words in frequent use in the school and community environment. It is wasteful to drill on words which the child will probably never use. The object of the drill, as already explained, is not to develop a *universal* spelling efficiency. The drill develops specific spelling ability primarily. While this remains true, it has been shown that there is a decided tendency to generalize when the elements are similar or identical in different situations, so that

the ability to spell lists of words is available with a very slight loss in written compositions (Chapter IV.). Yet no method will develop an efficiency so general that it will embrace any word whatsoever. We must, therefore, drill primarily upon words which it can be foreseen the child must spell in his out-of-the-school writing. Spelling drills should prepare directly for life.

9. A thorough drill is particularly valuable for the poor spellers (a fact apparently in harmony with the conclusions of Bean and Charters).

10. Teaching spelling exclusively by a well-organized drill gives more satisfactory results than teaching it exclusively by the incidental method.

11. Children differ in ideational and memory type. Spelling should, therefore, be so taught that appeal will be made to a variety of mental images, particularly the visual (through the presentation of visual characters), the auditory (through the sounding of words), and motor or auditory-motor (through analytical copying or writing, whispered vocalization or distinct pronunciation). This conclusion is enforced by several experiments (Meumann, Abbott, Kratz), but the pedagogy of the matter has not been sufficiently worked out. Meantime it is advisable to make a liberal rather than a limited appeal to various types of imagery.

BIBLIOGRAPHY.

1. Abbott, Edwina E., On the Analysis of Memory Consciousness in Orthography, Studies from the Psychological Laboratory of the University of Illinois, Vol. I, No. 1, 1909, Baltimore (Psychological Review Monograph).
2. Bailey, Eliza R., and Manly, John M., The Baily-Manly Spelling Books, 2 Vols., with Teacher's Manual, 1908, Boston.
3. Bean, C. Homer, Starvation and Mental Development, The Psychological Clinic, May 15, 1909, Philadelphia.
4. Chancellor, William E., Spelling, Journal of Education, 488, 517, 573, 607, 1910, Boston.
5. Charters, W. W., A Spelling Hospital in the High School, The School Review, 192, 1910, Chicago.
6. Cornman, Oliver P., Spelling in the Elementary School, 1902, Boston.
7. Fracker, George Cutler. The Transference of Training in Memory, The Psychological Review, Monograph Supplement, Vol. IX, No. 2, 56-102, 1908, Baltimore.
8. Hicks, Champion Spelling Book, 1909, New York.
9. Kratz, H. E., Studies and Observations in the School Room, 127, 1907, Boston.

10. Rice, J. M., *The Futility of the Spelling Grind*, The Forum, 163f, 409f, 1897, New York.
11. *Spelling in Milwaukee*, Journal of Education, 153, 270, 383, 410, 1910, Boston.
12. Wallin, J. E. Wallace, *Optical Illusions of Reversible Perspective*, a Volume of Historical and Experimental Researches, 1905, Princeton.
13. Wallin, J. E. Wallace, *Has the Drill Become Obsolescent. A Preliminary Discussion, Particularly with Reference to Spelling*, The Journal of Educational Psychology, 200, 1910, Baltimore.

INDEX

INDEX

- Abbott, 15, 84 f.
Accelerated pupils, relation to spelling efficiency, 60 f.
Age, relation to spelling efficiency, 58 f.; over-age, under-age, 60 f.
Aim, identity of in transfer, 74.
Attention, relation to habituation, 9, 17 f., 70 f., 75.
Automatic execution, 6 f., 8, 10, 42.
Automatization, of formal elements, 6-10, 12; process of, 8 f., 17 f.
Bailey and Manly, 22, 85.
Bean, 16, 84.
Chancellor, 36, 38, 76, 85.
Charters, 17, 84 f.
Cleveland schools, spelling efficiency in, 19 f., 35 f., 80 f.; in author's experiment, 26 f., 35 f.; spelling method in, 17 f., 21, 69, 77, 79 f.; spelling tests in, 19 f., 26 f.
Column spelling, see under spelling.
Common elements in transfer, see identity of elements.
Composition spelling, see under spelling.
Conclusions summarized, 82 f.
Content, mastery of, 11 f.
Contests, 18, 79 f., 82.
Cornman, 14 f., 36 f., 43 f., 50 f., 85.
Correlation, 1, 69.
Drill, as developing specialized efficiency, 12 f., 22 f.; effectiveness of, as shown by tests, 17, 19 f., 26 f., 41; instinctive basis of, 3; meaning of, 1 f., 5, 8 f.; objections against, 2-6, 76; relation to forgetfulness, 43, 68 f.; to poor spellers, 80 f., 84; to spontaneity, 71.
Drill technique, elements of, 8 f., 17 f., 22, 82; defective, 9-11; in relation to spelling efficiency, 17, 19 f., 22 f., 41, 43, 66 f., 82, 84; see method.
Facts, instrumental, 5-7.
Forgetfulness, 42; in relation to column drills, 43, 68 f.; to incidental method, 42.
Form, mastery of, 6 f., 8, 11 f.
Formal discipline, doctrine of, 13, 65; explanation of, 72 f.; see transfer.
Fracker, 66.
Generalization of acquired capacities, 14, 22, 72 f.; universality of, 23 f., 75, 83; see transfer.
Grade, relation to spelling efficiency, 35 f., 43 f.
Habit, disintegration of, 42; formation of, 8 f., 13, 17; in relation to incidental method, 11; individual, 11; elements of law of, 9, 12, 17 f.; racial, 10; avoidance of wrong, 13, 22, 83.

- Habituation of formal elements, 6-8; see drill.
Hicks, 85.
Ideal, identity of in transfer, 74.
Ideational types in spelling, 15 f., 22, 84.
Identity of elements in transfer of training, physiological, 72 f.;
psychical, 74 f.
Incidental method, 1 f.; as involved in drill, 12, 71; meaning of,
1, 12; merits of, 1 f., 4, 69-71, 78; objections against, 5 f., 11,
13, 16, 36, 45, 69, 78; supplementary to drill, 69, 71, 83; see
method.
Initial focalization in habit formation, 9, 12, 17.
Intelligence, relation to spelling proficiency, 60 f.
Knowledge, see testing.
Kratz, 16, 36, 39, 84 f.
Laggards, relation to spelling efficiency, 60 f., 80 f., 84.
Learning, natural method in spelling, 4, 79; see motivation.
Median, 36.
Memory, relation to sex, 56; to transfer, 66.
Method, identity of in transfer, 74; see drill, incidental.
Method in spelling, antithesis between incidental and drill, 71;
incidental and drill supplementary, 69-71; in relation to nor-
mal child, 45; to poor spellers, 60 f., 80 f., 84; value of, 1 f.,
15 f., 22, 39, 43, 45, 82; see learning, spelling.
Meumann, 15, 84.
Motivation, from aim, 9; from contents, 2, 5, 70, 76; from contests
(emulation), 18, 79 f., 88; from lack of control, 70 f.; from
felt needs, 2, 5, 43; from intrinsic needs, 70; with formal
materials, 75.
Natural method, see learning.
Need, feeling of as motive, see motivation.
Poor spellers, see age, method in spelling.
Practice, 8, 42; see drill, repetition.
Recency, relation to spelling efficiency, 41 f., 69.
Reflex neuroses, 73.
Repetition, attentive, 9, 12, 18, 71, 75, 81.
Restitution of function, 73.
Reviews, 18, 22, 80, 82.
Rice, 14 f., 21, 36 f., 43 f., 50, 63, 86.
Ruediger, 74.
Sex, relation to spelling efficiency, 49, 60, 63.
Skill, meaning of, 6 f.
Spelling, association and dissociation in, 68; explanation of trans-
fer in, 75 f.; investigations in, 14 f., 26 f., 37 f.; as instrumental,
5 f., 8; as social tool, 6, 8, 71; incorrect initial learning, 13, 22,
83; average time devoted to, 21; see Cleveland schools, con-
tests, drill, incidental, method, motivation.
Spelling efficiency in various cities, 15, 19 f., 21, 35 f., 80 f.; mini-
mum standard, 14; variation in, 15, 20 f., 40 f., 43 f., 47 f., 57 f.,
62 f.; in relation to age, 58 f.; to column spelling, 2, 14, 21,
26 f., 55, 65 f., 69; to grade, 43 f., 46 f., 62; to intelligence, 60 f.;

- to method, 15-18, 22, 43, 45; to normal, over and under-age pupils, 48, 60 f.; to recency, 41 f., 69; to composition or sentence writing, 2, 14, 18, 22, 26 f., 54, 65 f., 69, 78, 80, 84; to sex, 49 f., 60, 63; to personality of teacher, 14; to transfer, 65 f.; to transfer gain and loss, 65 f.; see Cleveland schools, drill, incidental.
- Substance, identity of in transfer, 74.
- Syllabification, 15, 80, 82.
- Teachers' efficiency, criterion of, 64.
- Technique, motivation of, 70; see drill, method, motivation.
- Testing knowledge, by application, 2, 12, 18, 70 f., 83; by verbal reproduction, 12, 70.
- Tests of spelling, 15-21, 26 f., 37 f.
- Test words in author's test, 31-34.
- Thorndike, 74.
- Time, devoted to spelling, 21.
- Tool facts, 5-7.
- Transfer of acquired capacities, doctrine of, 13 f., 65; explanation of, 72 ff.; gain or loss through, 65 f., 84; identity of elements in, 24, 62 f.; in memory experiment, 66; in spelling experiment, 22 ff., 65 ff.; legitimate tests of, 23 f.; universality of, 23 f., 75, 83.
- Values, content, 2, 5 f., 70, 76; formal or training, 76; instrumental, 5-7; intrinsic in relation to formal, 73.
- Vicarious functioning, 73.
- Variability, in relation to sex, 57, 60; see spelling efficiency.
- Wallin, 86.
- Words, basis of choice for drills, 75.
- Words, list used in author's test, 31-34; difficulty of, 39 f., 44; recency of, 41.

